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SUMMARY OF RECENT ABSTRACTS *

IV. TRYPANOSOMIASIS †

Epidemiology

The report of the British Tsetse Fly and Trypanosomiasis Committee for 1954-55 (p. 413) contains brief indications of the survey and control work carried out in Northern Rhodesia, the Gold Coast, Uganda and elsewhere.

LAUFER (p. 726) gives an account of sleeping sickness in Tanganyika, and its transmission. There is much evidence that game infected with *Trypanosoma rhodesiense* can act as a potential reservoir, but introduction of the disease into a new area can usually be traced to human beings. An alarming increase of cases took place in 1949, but it seems that this was not due to symptomless carriers, though patients who are not completely cured form a dangerous source of infection. Drought may have an important bearing on the spread of the disease because of poor nutrition, uncontrolled migration through tsetse areas in search of work, food and water, and fragmentation of the safe settlements. He discusses clinical findings and treatment. JACKSON (p. 415) reports *T. rhodesiense* infection in Africans engaged on tsetse research duties in 3 different places in East Africa where *Glossina morsitans* is the vector. He argues that wild animals must form a reservoir in nature, as they have been shown to do experimentally.

In Tanganyika (p. 1223) sleeping sickness is now largely an occupational disease, contracted when the people are travelling or hunting, fishing or gathering beeswax. The cleared settlements require constant vigilance

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1956, v. 54. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on trypanosomiasis in this series see the May issues of the *Tropical Diseases Bulletin* each year since 1939.

to keep them in good order—there are 62 in the Western Province, containing 250,000 people. Investigation of Mel B for advanced cases continues.

An outbreak of *T. rhodesiense* infection—the first to be reported from the Belgian Congo—is described by MARNEFFE (p. 293) from Urundi. The only tsetse fly in the area is *G. morsitans morsitans*, which also transmits the trypanosomes of cattle. Prophylaxis with pentamidine was used for control, but one case is reported in which this seems to have been inadequate. For treatment pentamidine was useful, and like suramin was effective in early cases. As is well known, tryparsamide is useful if the central nervous system changes are only slight, but for severe cases Arsobal gives good results, though it is toxic and should only be used for patients in hospital.

In Northern Nigeria (p. 294) the incidence of human trypanosomiasis in 1954–55 was 0·21% but the relapse rate was still 20·5%. Pentamidine prophylaxis has been very successful in mine labour forces. Control of tsetse flies continues by clearing and the use of plant poisons. Experiments have been made on the spraying of vegetation with insecticides.

Transmission

In his Presidential Address to the Royal Entomological Society of London BUXTON (p. 288) traced the development of knowledge of the influence of climate on the habits of tsetse flies. It is recognized that flies, at the height of the dry season, are restricted to primary permanent foci, where conditions are relatively favourable, spreading outwards as conditions improve. This fact has a strong practical bearing on measures of control, and the author traced the detailed and complicated field and laboratory work which was undertaken to investigate this important physiological relationship.

The production of puparia of tsetse flies in the laboratory has generally been unsatisfactory; NASH (p. 289) made extensive researches into such matters as the attractiveness of female to male flies and their willingness to mate. He finally mated females on the 3rd day, with twice as many males 7 days old, and then kept the females with relatively few young males. He showed that some old females could be both attractive and willing for refertilization. Willingness of young flies to mate is greatest soon after the sexes are put together, and virtually ceases after 23 hours, but this unwillingness can then be overcome by feeding the flies.

WILLETT (p. 724) describes a method for the dissection of *Glossina* in which complete exposure of the abdominal and thoracic organs is obtained with the minimum of disturbance. Details should be sought in the original.

In part of Tanganyika *G. morsitans* has been found in close association with glades (the sites of abandoned villages) in the *miombo*, where replete flies are found in the clearings and hungry flies in the woodland. BURSSELL

(p. 551) states that this is not the case in other parts of the country, where hungry flies are most numerous in the open stretches and replete flies are found in the woodland. This latter finding led to the formulation of the feeding-ground theory, which evidently does not apply throughout. Discriminative clearing of the glade interzones is effective in reclaiming the invaded areas; destruction of the "fringe-habitat" can be achieved adequately by clearing the upper canopy, and this leads to drastic reduction in fly populations.

In an experiment in which marked *G. morsitans* were released in a restricted area of East Africa, over a period of 15 months, JACKSON (p. 415) found that the flies were most numerous in tall *Brachystegia* woodland on moderate slopes, near open grassland. During the rains well-marked concentrations of flies occurred in the woodland; the hungriest flies were always found outside the *Brachystegia*. A negative correlation between the numbers of flies and the numbers of ungulates, and a positive correlation between the numbers of ungulates and the hunger of the flies, accord with the feeding-ground theory. In blood smears taken from *G. morsitans* collected in this work the precipitin test and the newly described inhibition test indicated a predominance of wart hog and bush pig as host animals, though spoor indicated that these animals formed only 10% of the mammals in the area. There were also many feeds on Bovidae, but pigs were 13 times more liked, or more available, than Bovidae (WEITZ and JACKSON, p. 416). Similarly, LOVEMORE (p. 865) in Southern Rhodesia found that nearly half the blood identified in *G. morsitans* was from pig—either wart hog or bush pig. Impala, buffalo and baboon, though common in the area, do not seem to have been much used for feeding. Elephant and rhinoceros blood was recognized, each in a few flies.

REID (p. 291) records observations on *G. morsitans ugandensis* in the Sudan where in the deciduous savannah it is linked with the tree *Mitragyna inermis* for dry-season foci, in association with game. In less arid regions it breeds in thickets more widely spread, and is not so dependent on *Mitragyna*. He gives details of animals on which the flies have fed. Cattle herded past foci of fly tend to become infected with *T. congolense* or *T. vivax*, and there is evidence that outside the tsetse areas mechanical transmission by tabanids and *Stomoxys* occurs.

OVAZZA *et al.* (p. 1278) collected 6 species of *Glossina* in Ethiopia, but have no data on human or animal trypanosomiasis there.

In Ruanda-Urundi *G. morsitans* occurs in a number of isolated patches or pockets. LAMBRECHT (p. 550) thinks that this patchy distribution is mainly the result of topographical and climatic factors, and of cultivation. He describes the dry-season haunts of the fly. *G. pallidipes* and *G. brevipalpis* are also found, and *G. palpalis martinii* along the shores of Lake Tanganyika.

In Nigeria PARKER (p. 1225) has shown that *G. palpalis* is influenced in choice of larviposition sites by both visual and tactile stimuli, but not

by olfactory stimuli. Dark objects are attractive, as are large particles of soil which provide a rough surface. In nature breeding sites are a few degrees cooler than their surroundings. He (p. 1227) shows that the larvae burrow more readily into soil with large particles—and therefore rough surface—than into soil with small particles and smooth surface; and more readily into dry than damp soil. The larvae are photo-negative. The behaviour of adults and larvae tends to ensure that the pupae will be well protected and will avoid water-logging.

CAMBOURNAC and GÂNDARA (p. 725) give a list of the species of *Glossina* in the Congo Province of north-west Angola, concluding that only 3 exist there—*G. palpalis palpalis*, *G. fuscipes quanzensis*, and *G. schwetzi*. They (p. 725), however, identified *G. morsitans* in a belt of woodland and grassy plains near the river Cuando in the south-east of the country.

Aetiology

An account of the morphology and life cycle of trypanosomes is given by NOBLE (p. 160).

DEVIGNAT and DRESSE (p. 553) describe a simple technique for concentrating trypanosomes in blood.

RYLEY (p. 978) describes the comparative carbohydrate metabolism of 11 species of trypanosomes, and GRANT and FULTON (p. 978) the glucose catabolism of *T. rhodesiense*.

It has been suggested that *T. rhodesiense* would revert to its ancestral form, *T. brucei*, if transmitted cyclically through mammals other than man. Corson began a long experiment on cyclical transmission in sheep to test this view and his strain has been carried on by WILLETT and FAIRBAIRN (p. 550). After 18½ years it has remained infective to man, but the incubation period in man has steadily increased, indicating a reduction in virulence, and its infectivity for man has fluctuated cyclically. Similar changes have been observed in its behaviour in sheep. A subsidiary line through antelope also retained infectivity to man, with fluctuation.

GERZELI (p. 723) reports on cytochemical and morphological research on various species of trypanosomes, including *T. gambiense* and *T. brucei* as well as trypanosomes from fish, which indicate a number of common biochemical characteristics, in spite of differences in bionomics and habitats.

In mice *T. gambiense* usually reproduces by binary fission every 6 hours, and the animals die when the number of trypanosomes reaches 1,420,000 per cmm. HENIGST (p. 723) describes a laboratory strain which divides in less than 5 hours and which reaches 5,250,000 per cmm. at the time of death. Towards the end of the infection many of the trypanosomes appear to be degenerating, possibly as a result of antibody formation.

FROMENTIN (p. 552) used sodium salicylate by mouth to accentuate the infection of rats with *T. gambiense*, and a strain previously maintainable

only in guineapigs could in this way be passaged in rats. She (p. 414) inoculated rats with mixtures of *T. brucei* and *T. gambiense*, and unlike some earlier authorities she found no indication of the production of hybrids. *T. gambiense* was "swamped" by the more rapid multiplication of *T. brucei*, but the incubation period of the mixed strain was the same as that of *T. brucei*, there was cross-immunity between them, and human serum was trypanocidal to the mixed strain and *T. brucei* but not to *T. gambiense*. Moreover, the mixed strains did not produce infection on inoculation into a schizophrenic patient, but *T. gambiense* alone infected another patient.

REUSSE (p. 1227) shows that *T. brucei*, *T. congolense* and *T. evansi*, and other protozoa, can be kept at -76°C . for several months, and remain viable. This provides a practical method for the maintenance of laboratory strains.

Clinical Findings: Treatment

A technique for estimating the protein of the cerebrospinal fluid is described by GALL *et al.* (p. 866).

False positive serum reactions for syphilis are rare in sleeping sickness, and when these tests are repeatedly and definitely positive the diagnosis of concomitant syphilis is justified. RANQUE *et al.* (p. 417) found that sleeping sickness does not result in positive TPI tests, which may be useful in uncovering false positive serum tests.

The diamidines are excreted largely in the urine and bile; LAUNOX (p. 417) has shown that in lactating rats lomidine is not excreted in the milk sufficiently to protect the sucklings from infection with *T. gambiense*. Rapid cure in an early case of *T. rhodesiense* sleeping sickness is reported by MOSSOP (p. 1319) who used pentamidine isethionate.

In investigating a strain of *T. rhodesiense* resistant to stilbamidine FULTON and GRANT (p. 418) found that (as judged by the degree of fluorescence of certain structures in the trypanosomes after exposure to the drug) although the drug was absorbed by this resistant strain, significantly more was taken up by a normal strain. This was true whether exposure was *in vivo* or *in vitro*.

PACKCHANIAN (p. 31) used nitrofurazone orally or intraperitoneally in the treatment of mice infected with *T. gambiense*, and records cure in 80% with total doses of 600 mgm. per kgm.; other nitrofurans compounds were also useful. The author suggests that nitrofurans could be used in human cases refractory to other drugs.

TRINCÃO *et al.* (pp. 419, 1103) found that a single injection of stylomycin (puromycin) before inoculation of mice with *T. rhodesiense* did not prevent infection, but that treatment starting on the day of infection and lasting 10 days was curative, with *T. gambiense* as well as *T. rhodesiense*. If treatment was delayed for 5 days it was not curative.

Control

In the Annual Report for 1954-55 of the East African Tsetse and Trypanosomiasis Research and Reclamation Organization FORD (p. 942) reviews the progress achieved in elimination of fly from infected areas (about 3% of the infected area in the last 25 years, but the area is immense). The limiting factor is not the cost of reclamation but the cost of developing the reclaimed land. Slow progress is likely as the East African economy continues to expand. The main practical problems relate to the contact zones between infested bush and occupied land. *G. morsitans* feeds largely on wild pig, and *G. pallidipes* on bushbuck. Strains of *T. rhodesiense* have been isolated in Uganda and Kenya where previous outbreaks had been thought to be due to *T. gambiense*. Much information is given on control measures in many areas.

The Report of the Commission of Inquiry on Human and Animal Trypanosomiasis in Southern Rhodesia (p. 1224) gives a general account of *G. morsitans* and *G. pallidipes*. The problems of control largely relate to *G. morsitans* and to trypanosomiasis of cattle, since the incidence of human disease is slight, though the influx of large numbers of people to work on a new dam in the endemic area may prove to be a disturbing factor. Controlled destruction of game has been a prominent method of control in the past, and until discriminative clearing with close settlement and possibly the use of insecticides has been proved useful, destruction must continue. DU TORR (p. 32) gives an extensive account of the control of tsetse flies in Zululand, where *G. pallidipes* is important. Certain game reserves were primary breeding centres and the flies dispersed widely from these. Aerial spraying of DDT and later (and more satisfactorily) BHC was concentrated on these centres, and the sprayings, repeated many times at intervals of 2-4 weeks and supplemented in places by the use of insecticidal smokes, cattle dips, and discriminative clearing of thickets, proved very successful in drastically reducing the number of flies caught in traps or on bait cattle. Control by destruction of game is now recommended only for localization of wild game in reserves so as to concentrate fly and fly-breeding and reduce the area needing aerial treatment with insecticides. FIEDLER *et al.* (p. 295) show that the spraying of insecticides from aircraft resulted in a steady decline in the numbers of pupae deposited though there was no direct effect on the pupae. There seems to be a decrease in vigour in the pupae produced by tsetse subjected to insecticidal attack. Parasites of tsetse pupae also declined, more quickly than the flies.

FAIRCLOUGH (p. 1320) has found insecticidal fogs (with DDT) useful for treating the outsides of goods trains to prevent them from carrying tsetse flies in Kenya.

In Northern Nigeria during 1955 (p. 1409) there was some increase in incidence of sleeping sickness, and observations indicate that static treatment centres failed to control the disease; the need to seek cases actively

is stressed. For tsetse control the present policy is to survey cleared areas, and to divide them into blocks which will be protected by barrier clearings reslashed each year by paid labourers. Experiments in the use of DDT on vegetation have been carried out, with encouraging results. "Obstructive clearing" is continued and is relatively cheap; tsetse movement still occurred in places so treated, and these are to be isolated by barrier clearings to determine whether fly can live and breed in this type of clearing.

Trypanosomiasis of Animals

In work on pregnant female mice and hamsters infected with various trypanosomes WERNER (p. 419) found that when the infection was chronic there was a tendency for the offspring to be under-developed. The reason is not clear.

HOARE (p. 1321) has studied the taxonomic relationship of *T. evansi*. Polymorphism was observed and the trypanosome should therefore be placed in the *brucei* group. It probably originated in tropical Africa from camels infected with *T. brucei*, which strayed outside the tsetse areas and became the source of strains transmitted mechanically by tabanid flies. ALWAR and RAMANUJACHARI (p. 554) have succeeded in infecting chicks with *T. evansi*.

Infection rates of *G. palpalis* with *T. vivax* are correlated with temperature and the mean length of the trypanosomes on which the flies have fed. FAIRBAIRN and WATSON (p. 160) suggest that for laboratory transmission the pupae should be incubated at 28°C. and the flies maintained at 23°C.

From animal experiments with *T. equiperdum* HAWKING and THURSTON (p. 419) conclude that the power of Antrycide *in vitro* to destroy infectivity is probably more significant for its therapeutic action *in vivo* than is its direct trypanocidal action *in vitro*.

When mice infected with *T. equiperdum* were treated with subcurative doses of oxophenarsine [Mapharside] the trypanosomes became resistant to the drug and also became agglutinated in blood diluted with saline and kept at 20°–30°C. CANTRELL (p. 729) shows that the agglutinating component could be destroyed by treating infected animals with larger doses; the blood of mice freed of an agglutinating strain did not agglutinate normal trypanosomes.

CHAGAS'S DISEASE

Epidemiology: Transmission

Reported infection rates with *T. cruzi* in man include 13.6% and 3.8%, respectively, as estimated by complement-fixation and xenodiagnostic tests in Chile (PINO *et al.*, p. 35), 24.54% (urban sera) and 36.56% (rural sera) by complement-fixation tests in Itaquí, Brazil (BRANT *et al.*, p. 554), and 45 of 66 persons in Peru (NÁQUIRA and NÁQUIRA, p. 35).

ESPINOZA (p. 422) notes that most of the patients he records from Ecuador came from the city of Guayaquil, and that *T. dimidiata*, the vector, is exclusively an urban species. The first known autochthonous case of Chagas's disease in the United States is reported by WOODY and WOODY (p. 421).

The transmission of *T. cruzi* in transfused blood is a problem, and NUSSENZWEIG *et al.* (p. 163) have shown that the organism will persist for 21 days in blood stored at 6°C., and that even after centrifugation it may be found in the plasma. They tried a number of chemicals for action on the trypanosome in blood, but none was suitable for treatment of blood banks, because of haemolytic action or of toxicity. Other chemicals tested had no appreciable effect on the trypanosomes.

Reservoir hosts reported for *T. cruzi* include guineapigs, rats, *Didelphys* and a cat (ESPINOZA, *ibid.*; HERRER *et al.*, *ibid.*; NÁQUIRA and NÁQUIRA, *ibid.*). Hosts on which triatomids feed include dogs, cats, man and chickens (MAYER and ALCARAZ, p. 1411; PINO *et al.*, *ibid.*).

Many studies of the distribution of triatomids have been published, and infection rates with *T. cruzi* have been recorded, which are commonly up to about 20–25%, though higher rates have been reported.

Triatoma infestans is a main vector in Argentina (DIAS, p. 555), Chile (PINO *et al.*, p. 35), Peru (NÁQUIRA and NÁQUIRA, *ibid.*; HERRER *et al.*, p. 1104), and Brazil (LÔBO *et al.*, p. 424; DIAS, p. 425; DA SILVA and CORRÊA, p. 730). Other infected triatomids include *Panstrongylus herreri* (HERRER *et al.*, *ibid.*); *P. megistus* (DE LUCENA and COSTA, p. 162; PINOTTI, p. 166; DIAS, p. 425; DA SILVA and CORRÊA, *ibid.*); *T. sordida* (PINOTTI, *ibid.*; DA SILVA and CORRÊA, *ibid.*); *T. dimidiata* (CÉSPEDES and AGUILAR, p. 165; ESPINOZA, *ibid.*); and *Rhodnius prolixus* (CÉSPEDES and AGUILAR, *ibid.*). High infection rates have been recorded for *P. megistus*, but the others are regarded as secondary vectors. In part of Brazil DIAS (*ibid.*) notes that the indices of infection for *P. megistus* were higher in rural than in urban areas, though equal for *T. infestans*.

GALVÃO (p. 866) has constructed a key to the Brazilian species of the genus *Triatoma*.

SENECA and WOLF (p. 731) report *T. cruzi* infection of an Indian rhesus monkey examined in a laboratory in the United States, which supports the view that it may be found in the eastern hemisphere as well as in the Americas, but in comment Garnham remarks that the authors did not consider the possibility of cross infection in the laboratory by bed bugs.

CORRÊA (p. 730) describes his method of rearing various Triatominae in the laboratory. GOODCHILD (p. 557) reports observations on growth and egg production of the blood-sucking reduviids. Although there is only one bacterial symbiont to be found in *Rhodnius prolixus*, he (p. 427) has recovered 4 types of micro-organisms from *T. infestans*. He describes these and discusses their function.

HARINGTON (p. 1322) reports the finding of histamine and histidine in the excreta of *R. prolixus*.

HACK (p. 1322) reports studies on the biology of *T. infestans*.

WIESINGER (p. 1228) shows that *T. infestans* hides in dark, rough, dry surroundings and is stimulated to activity by hunger, avoiding strong light and temperatures below 20°C. There is response to warmth especially when associated with CO₂, which may explain a preference for feeding on the face of the host. She discusses the position and functioning of the sense organs.

Aetiology

CITRI and GROSSOWICZ (pp. 297, 426) describe new fluid media, containing haematin, for the cultivation of *T. cruzi*. Blood-agar media are not suitable for the preparation of antigens, owing to impurities, and SILVA (p. 37) describes a medium which avoids this difficulty.

BIANCHINI (p. 164) describes a new fixing and staining technique for *T. cruzi* in blood films, which prevents the trypanosomes from breaking up. PIZZI and DÍAZ (p. 555) studied the Feulgen reaction in *T. cruzi*; some details are given in the original abstract.

AGOSIN and VON BRAND (p. 426) discuss the intracellular distribution of the succinic dehydrogenase of *T. cruzi*, and (p. 729) the utilization of Krebs cycle intermediates by *T. cruzi* and *Leishmania tropica* in cultures.

DALMA and SCHEFFELS (p. 36) found that the thermal death points of *T. cruzi* were within the temperature range tolerated by patients subjected to pyretotherapy, though viability in the human host might differ from viability in artificial culture.

TALIAFERRO and PIZZI (p. 297) investigated the connective tissue reactions of normal and immunized mice to a reticulotropic strain of *T. cruzi*, using blood forms, or culture forms of low virulence. The dividing forms of this strain were commonly found in macrophages, but were more rare in fibroblasts, muscle cells, cartilage and bone. In non-immune animals the virulent trypanosomes developed normally in free and fixed macrophages, but in mice infected with culture forms the development of acquired immunity was shown by increased phagocytosis. In the non-immune animals destruction of the parasites was the predominating process, but in the immune animals regeneration and multiplication were effected by hyperplasia of lymphoid, myeloid and macrophage cells, which provided for reserves for the production of macrophages and probably antibodies.

In *T. cruzi* infection destruction of the parasite is effected by phagocytosis (largely by inflammatory macrophages). The inflammation which occurs at the beginning should be distinguished from that which develops in the late stages and which PIZZI and RUBIO (p. 298) hold to be allergic in character. In the immune state the macrophages become destructive phagocytes, probably by production of non-lytic antibodies.

When a strain of *T. cruzi*, maintained for several years in culture (and of reduced virulence) was injected intraperitoneally into rats and mice, there was lysis and phagocytosis of the crithidial forms, and phagocytosis

of trypanosome and leishmania forms, especially in older cultures. RUBIO (p. 556), however, shows that when the same strain kept in serial animal passages was injected, there was little phagocytosis and there was a high degree of parasitaemia. The virulence of recently isolated cultures can be reinforced by serial passages through rodents and by treatment of the animals with cortisone, which probably acts by inhibiting phagocytosis, which leads to high parasitaemia.

Immunization of mice with cultures of *T. cruzi* of low virulence was accompanied by marked increase in the size of the spleen, associated with the production of antibodies, and later injection of a virulent strain was followed by new increase in the size of the spleen, but the rise of antibody was much less. PIZZI and KNIERIM (p. 978) show that although splenectomy depressed the formation of antibody it had no effect on the course of the infection.

Cortisone and hydrocortisone exercise a deleterious effect on *T. cruzi* infection in mice, leading to death, but compound S (17-hydroxy-11-desoxycorticosterone) did not, and in fact, as shown by SENECA and IDES (p. 299), protected against the effects of cortisone in certain conditions.

Clinical Findings

ANDRADE and ANDRADE (p. 1323) discuss chronic myocarditis in Chagas's disease. There are probably 2 fundamental lesions, one inflammatory resulting from allergic reactions, and the other ischaemic from microscopic infarcts. Pulmonary thrombo-embolism is reported by ROCHA and ANDRADE (p. 1323) in patients with chronic myocarditis due to Chagas's disease.

Control

PINOTTI (p. 166) sums up the work done in Brazil on the control of Chagas's disease in the period 1950-52. *T. infestans*, *T. sordida* and *P. megistus* are heavily infected species, and the first and last are predominant vectors in the States where the disease is most serious. Extensive programmes of spraying with BHC in houses and outbuildings have been carried out, and experience indicates that 2 applications each year are necessary for eradication. CORRÊA and SCHIAVI (p. 731) tested various dosages of BHC per unit area of mud for lethal action on *T. infestans*. At 1.0 gm. of gamma isomer per square metre mortality was 100% 4 days after application of the insecticide, but at 15 days it had fallen to 30%. The authors advocate a dosage of 1.0 gm. per square metre for dwellings.

Other Trypanosomes

The life-cycle of *T. rangeli* in warm-blooded animals and *Rhodnius prolixus* has been studied by HERBIG-SANDREUTER (p. 560).

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

SCHWARTZ, R. & TUTTLE, W. B. **Malaria in Veterans of the Korean War: a Review of 128 Admissions for Malaria to a Veterans Hospital.** *Amer. J. Med. Sci.* 1956, Nov., v. 232, No. 5, 568–71, 4 figs.

Following the Korean War 117 ex-military personnel were admitted to a Veterans Hospital in Pennsylvania suffering from *P. vivax* malaria. In one patient *P. malariae* was also demonstrated. 9 of these patients were subsequently re-admitted in a relapse. Of the 117 only 5 denied having taken prophylactic antimalarials in Korea. Treatment for overt malaria had previously been given to 29. The interval of time between leaving Korea and admission varied from 1 to 15 months and averaged 6–7 months.

A significant reduction in the number of admissions followed the institution of mass primaquine therapy of military personnel in August 1952 during their return to the United States, although 15 who had apparently been so treated developed *P. vivax* malaria and are included in the 117 patients reported.

In 1 patient a severe anaemia, with a leukaemoid reaction, occurred. Treatment consisted of 2.5 gm. chloroquine phosphate (presumably 1.5 gm. of base) in divided doses over 72 hours. After primaquine (15 mgm. base) daily for 14 days was added to the treatment in June 1953 no further relapses ensued.

[The efficacy of primaquine in preventing relapses of *P. vivax* malaria is demonstrated.]

Frederick J. Wright

BERTRAM, D. S. & MCGREGOR, I. A. **Catches in the Gambia, West Africa, of *Anopheles gambiae* Giles and *A. gambiae* var. *melas* Theobald in Entrance Traps of a Baited Portable Wooden Hut, with special reference to the Effect of Wind Direction.** *Bull. Entom. Res.* 1956, Dec., v. 47, Pt. 4, 669–81, 4 text figs. & 3 figs. on pl. [23 refs.]

In the village of Keneba in the Gambia *Anopheles gambiae* and *A. gambiae* var. *melas* are the dominant vectors of malaria and filariasis [this *Bulletin*, 1953, v. 50, 57]. Assessment of the efficiency of control methods has demanded fairly detailed knowledge of local mosquito biology and behaviour; in this assessment elimination of as many of the variables as possible was imperative and, in pursuit of this, experimental mud huts conforming to the local pattern of village houses were built and used as catching houses. Traps of the type first used by Muirhead Thomson

[this *Bulletin*, 1946, v. 43, 93] have been in use. For the research project described in this paper, a portable wooden hut was fitted with two inlet traps of the same design as the usual exit trap; these were placed so as to catch mosquitoes as they entered the hut by the windows: no other points of entry were available. Substantial catches of up to 1,240 females of mixed population of *A. gambiae* and the variety *melas* were taken in a night.

From their observations the authors conclude that smell and other air-borne products of the human bait were dispersed by wind from the hut through the leeward window, creating only on this side of the hut the stimulus of attraction which directed the mosquitoes into the hut. As a result, the mosquitoes concentrated exclusively in the leeward trap when the wind persisted from one direction. In the instance of variable wind the attractive stimuli were dispersed and entry of mosquitoes was likewise variable in the two traps. Heavy vertical rain might also have had a similar effect on the attractive stimuli and again mosquitoes, not deterred by the rain, entered both traps simultaneously. It follows from these conclusions that if only one trap is available to the mosquito for entry into a hut of the kind used, serious sampling deficiencies would result from changes in wind direction. It seems that visual mechanisms had no effect in determining the approach of the mosquito to the hut.

From hourly collections made from dusk to dawn a curve of activity for *A. gambiae* and the variety *melas* was obtained resembling the biting cycle reported elsewhere by other authors [*ibid.*, 1947, v. 44, 516; 1948, v. 45, 482; 1950, v. 47, 304], the greatest activity occurring between midnight and 0.600 hours. The first entries occurred just before complete darkness in the evening and the last in good light about 30 minutes after sunrise. No males of *A. gambiae* or variety *melas* were taken in the traps.

Such a hut with a window trap in each of the four walls and a cowl over each window to keep out rain appears to be a simple and convenient sampling device for certain types of investigations into the biology and behaviour of *A. gambiae* and the variety *melas*. R. Ford Tredre

METSELAAR, D. **Variations in the Sporozoite Rate of Anophelines of the punctulatus Group.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, Dec., v. 8, No. 4, 363-4.

"In an experiment made in the Nimboran valley (Netherlands New-Guinea), a significantly higher sporozoite rate was found in mosquitoes of the *A. punctulatus* group, collected in daytime on the inner walls of native houses, than in those caught on human baits in the early hours of the evening. It is assumed that there are relatively more older mosquitoes among those entering the houses for a blood meal after midnight—and of which a larger percentage remains indoors after dawn—than among the mosquitoes which enter the houses before midnight. This might explain the higher sporozoite rate."

CIUCA, M., CHELARESCU, M., ȘOFLETEA, A., CONSTANTINESCU, P., TERITEANU, E., CORTEZ, P., BALANOVSKI, G. & ILIEȘ, M. Contribution expérimentale à l'étude de l'immunité dans le paludisme. [**Studies on Immunity in Malaria**] pp. 61-108. 1955. Bucharest: Editions de l'Académie de la République Roumaine.

Professor Ciucă and collaborators have produced an important monograph on induced malaria in cases of cerebral syphilis over a period of 30 years in Rumania. The monograph itself is in Rumanian, but is accompanied by separate French and Russian summaries, of such a length (about 50 pages each) that many details are included. [The review has been made from the French summary and from nearly a hundred tables in the text.]

Ciucă himself contributes an introduction which firstly surveys the subject of malaria in relation to immunity, and secondly summarizes the results of work done in Rumania. He points out the value to malaria research of scientific centres employing malaria therapy. 5 species of parasite were employed (made up of 7 strains of *Plasmodium vivax*, 4 strains of *P. malariae*, 4 strains of *P. falciparum*, 2 imported strains of *P. ovale* and 1 imported strain of *P. knowlesi*). As a rule transmission was effected by the inoculation of infective blood, and in these lines gametogony gradually disappeared, though repeated blood passage as a rule had little effect on the virulence or morphology of the asexual forms. Some strains—e.g., *P. falciparum* T.M.R. 78—were maintained by both blood and mosquito (*elutus*) passage (345 blood, 49 sporozoite), and the physiological characters of the parasite were thereby preserved over 27 years. In all, 11,838 cases of induced malaria were studied, plus an additional 50% reinfections; less than 1% proved refractory. A sub-microscopic parasitaemia was tested by transfusion of blood and this procedure enabled the exact duration of premunition to be determined. Quartan malaria may persist for nearly 10 years, malignant tertian 27 months and benign tertian exceptionally for 8 years.

There are 2 therapeutic centres in Rumania, at Berceni and at Socola. Detailed observations were made at these two places and the results are analysed in detail.

At Berceni, 6,382 patients were treated by malaria therapy. It was noted that the length of the incubation period after inoculation of infective blood depended upon compatibility of blood between donor and recipient: if compatible it was 5 days, if incompatible 8-8 days. Gametocytes of *P. vivax* appeared between the second and thirteenth days of parasitaemia and males to females were in a proportion of 1 to 4; in one strain (St) gametocytes entirely disappeared after 73 blood passages, in another (Mt) after 150. The course of the disease is then described, and it was noted that re-inoculation with heterologous strains of *P. vivax* was usually followed by a normal attack. *P. malariae* gave rise to a prolonged parasitaemia which in one strain reached a height of 29,500 per cu.mm.; band forms were rarely encountered, gametocytes

made their appearance after 6 to 19 days and the strains lost these forms entirely after 12 years of blood passage. Two local strains of *P. falciparum* proved excessively virulent, a third was less so (MT 78); parasitaemia reached a height of 100,000 per cu.mm.; gametocytes appeared between the fourth and twelfth days, and schizonts with 8 to 20 merozoites were seen in varying proportions. *P. ovale* was used for 888 patients and was always introduced by the intravenous inoculation of blood; 92% responded and the strain maintained its characters unchanged throughout with a maximum parasitaemia of 50,000 per cu.mm. and an appearance of gametocytes between the fifth and eighth days (in 8.7% of cases, but they disappeared after 117 passages). There was no cross-immunity between *P. ovale* and the other species.

P. knowlesi was used for 783 patients at Berceni, of whom 95.4% developed the disease. This must be by far the largest group of human beings inoculated with this simian parasite and, for the first time, a proper study of the disease in man has been made possible. Infection was always by blood inoculation, subcutaneous, intramuscular or intravenous, the respective incubation periods being 7.4, 7.4 and 4.1 days on an average. The parasite remained unchanged in morphology and in virulence to rhesus monkeys throughout 8 years of passage, but after 170 human passages it became more virulent in man: originally only 24% of patients had to receive treatment; the figure rose to 74% after 4 years of blood passage, while the gametocyte incidence rose from 4% to 20%. A maximum of 13 paroxysms, usually quotidian, occurred in an attack, the temperature sometimes reaching 42°C., though in the majority it was between 40° and 41°. The density of parasitaemia was greater than in the human species and was often 540,000 per cu.mm. A single relapse 76 days after the original (treated) attack occurred. True sterilizing immunity follows infection with *P. knowlesi* in man; in fact, if parasites are inoculated into an immune person they are destroyed within 6 hours as shown by the negative reaction of sub-inoculated rhesus monkeys. There is a certain degree of cross-immunity between *P. knowlesi* and the human parasites, particularly *P. malariae*.

The therapeutic centre of Socola (Jassy) treated 5,456 patients with malaria of the same 5 species of parasite, but here often by sporozoite induction including 8 *P. ovale*, though never by this method with *P. malariae* or *P. knowlesi*. Repeated blood passage diminished the infectivity of the blood to mosquitoes in *P. vivax* passages, but not in *P. falciparum*. *P. vivax* oöcysts were seen as early as 3 days and sporozoites in 10; the greatest number of oöcysts were found in imported strains of this parasite. *P. falciparum* oöcysts were seen as early as 4 days and sporozoites in 9. Details of these infections are then given in relation to susceptible and semi-immune people and the persistence of immunity. An interesting section deals with mixed infections and shows how one species in turn dominates another, usually *P. vivax* over *P. falciparum*. It is emphasized that the immunity acquired after

infection with *P. malariae* is of a different type than that of the other species—in the former in three-quarters of the cases it is of the true or sterilizing type, while in the latter it is premunition.

Finally, Ciucă sums up the results of antimalarial work in Rumania which has already reduced the malariological indices to nil in many parts of the country and has for its aim the total eradication of the disease.

[Similar observations on induced malaria have been made in other large centres using malaria therapy, such as Horton in England and Milledgeville in U.S.A., and have been reported in various journals over a number of years. It would be useful if these centres could collect the information, as Ciucă has done, and publish it in monograph form, when the findings would be readily available for comparison.]

P. C. C. Garnham

BEZON, A. Résultats d'une enquête sur la fréquence des hépatomégalias chez l'enfant Kabré de moins de 15 ans. (Cercle de Lama-Kara—Togo.) [**Results of an Investigation into the Frequency of Hepatomegaly among Kabré Children under 15 Years of Age (Lama-Kara District, Togo)**] *Méd. Trop.* Marseilles. 1956, Sept.-Oct., v. 16, No. 5, 677-89, 1 graph. [35 refs.]

The author notes the lack of agreement on the age at which the liver commonly ceases to be palpable in health. Although a rachitic chest is an unlikely cause for a palpable liver in the tropics he notes that hyperlaxity of the attachments is frequent. To overcome errors of interpretation, as far as possible, children up to the age of 2 years were examined supine, but at later ages, standing. Evidence of splenomegaly was sought also. Altogether 1,245 children under the age of 15 years were examined, one group consisted of 428 unselected children, the second of 817 schoolchildren. The latter group differed from the former only in that antimalarial chemoprophylaxis was used. The findings were submitted to statistical evaluation.

Of the 1,245 children 43.9% were found to have palpable livers, none unduly hard or nodular but some seemed unusually soft. Hepatomegaly showed no difference between the sexes but the incidence increased steeply from age 8 months to 5 years and showed a slow reduction between 5 and 10 years and more steeply from 10 to 15 years. By contrast the peak incidence of splenomegaly occurred at the earlier age of between 8 months and 2 years. This was also clearly seen in those exhibiting hepatomegaly without splenomegaly. Further, although malarial prophylaxis was associated with a halving of the rate of splenomegaly it had no effect on hepatomegaly. The relation of hepatomegaly to urinary schistosomiasis is difficult to evaluate for the frequency of urinary symptoms is not indicative of the degree of incidence of vesical schistosomiasis and there appeared to be no significant relation between hepatomegaly and cystitis.

In interpretation of the findings the author considers that malaria may be associated with hepatomegaly and that the liver remains enlarged longer than the spleen, but between 5 and 15 years hepatomegaly is uninfluenced by chemoprophylaxis. He suggests that other factors such as malnutrition may be responsible, especially as the age of maximum incidence of hepatomegaly corresponds with the post-weaning period when kwashiorkor is prone to develop. The influence of schistosomiasis in later childhood is as yet undetermined. *Frederick J. Wright*

Arsov, D. Les effets de l'adrénaline intraveineuse dans les hypersplénies du paludisme et du kala-azar. [**The Effects of Intravenous Adrenaline in the Splenomegalies of Malaria and Kala Azar**] *Acta Facultatis Med. Skopiensis*. Skopje. 1954, v. 1, 1-38, 16 figs.

The author has studied the effects of administering daily intravenous adrenaline to patients with splenomegaly. He modified Ascoli's method by using 0.02 mgm. initially, increasing during 3 to 4 days to 0.1 mgm. and continuing with that dose for 20 to 50 days. The adrenaline is dissolved in 10 ml. of fluid and injected at the rate of 1 ml. a minute; at this speed no accidents occurred. The response of the patient as exhibited by his general condition, the contraction of the spleen and reduction in size of the liver (where this was also enlarged initially) and the response of the marrow and circulating blood, was fully investigated. The author found that the response of the constituents of the blood during the first few hours after a test dose of 1 mgm. adrenaline subcutaneously gave a reliable indication of the response likely to follow prolonged intravenous therapy.

He divides the patients studied into 4 groups: (1) congestive splenomegaly; (2) fibro-congestive splenomegaly; (3) fibro-congestive splenomegaly in pregnancy and pernicious anaemia; (4) splenomegaly in kala azar.

The author finds an excellent response in Group 1. In Group 2 improvement may occur and it is then a useful pre-operative measure before splenectomy. In Group 3 intravenous adrenaline can only be regarded as of very secondary value to treatment by liver or vitamin B12. The author believes that adrenaline expedites the resolution of splenomegaly in cases of kala azar (Group 4).

It is suggested that these results follow from a non-specific stimulus by means of adrenaline to the functions of the pituitary and adrenal cortex.

[The fully documented clinical results are impressive but in the absence of untreated controls the effect of adrenaline is difficult to evaluate. Lack of appreciation of Ascoli's method may be due to its employment chiefly in those designated by the author as Group 2.]

Frederick J. Wright

BRUCE-CHWATT, L. J. **Chemotherapy in relation to Possibilities of Malaria Eradication in Tropical Africa.** *Bull. World Health Organization.* Geneva. 1956, v. 15, Nos. 3, 4 & 5, 852-62. [Refs. in footnotes.]

The development of resistance by anophelines to residual insecticides makes the problem of malarial chemoprophylaxis urgent. To effect eradication of malaria prolonged prophylaxis by a whole community would be required. At present there is no malarial prophylactic with a prolonged action comparable to that of the residual insecticides or to pentamidine in prevention of trypanosomiasis and the known occurrence of resistance to pyrimethamine detracts from its value in this regard. Although prolonged chemotherapy for rural communities is proving a practical possibility in the treatment of leprosy, the provision and supervision of chemoprophylaxis for an indigenous people in an area of holoendemic malaria, where adults are not conscious of being infected, would pose an entirely different problem. Nevertheless the efficiency of chloroquine and amodiaquine as suppressants brings the problem within the reach of practical possibilities in certain areas, although eradication from the whole of tropical Africa is still a formidable problem apparently insuperable with the present weapons, financial resources and degree of education of the communities concerned.

[The author refers to holoendemic malaria interfering with education and "sapping the energy and strength of the people". This is not generally agreed. (See this *Bulletin*, 1950, v. 47, 677; 1955, v. 52, 1168.)]

Frederick J. Wright

BHOMBORE, S. R., SITARAMAN, N. L. & ACHUTHAN, C. **Field Studies on the Relative Efficacy of Three Dosage Regimens of D.D.T. in Malaria Control in an Irrigated Tract in Mysore State.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1956, Sept., v. 4, No. 5, 150-62, 1 chart & 1 map.

The object of these studies was to determine whether a single large dosage of DDT is better than multiple small doses for the successful control of malaria.

A highly malarious area in the Hassan District of Mysore State was chosen for the experiment. The total population in 22 villages was 5,086. Irrigation had been practised there for more than 50 years and the irrigation season extended from June to January. In this area there were 18 species of *Anopheles*. The malaria vector was *A. culicifacies* though *A. fluviatilis* was also suspected. The malaria transmission season was from September to January.

In September 1950 a group of villages was sprayed with a single application of DDT at 200 mgm. per square foot. Subsequent sprayings

of this group were done in May 1951 and 1952 before the irrigation season started.

A second group of villages received DDT at a dosage of 100 mgm. per square foot once every 3 months during the irrigation season and a third group was sprayed at intervals of 6 weeks with 56 mgm. per square foot. In these 2 groups of villages the last sprayings were done in June 1952. 5 identical villages were left unsprayed and served as a comparison area and observations were continued until August 1953.

These field trials showed that 3 rounds of 200 mgm./sq. ft. and 5 rounds of 100 mgm./sq. ft. and 8 rounds of 56 mgm/sq. ft. were equally effective in the control of malaria. They also showed that a single large dose of 200 mgm. DDT per sq. ft. applied once at the beginning of the transmission season was as effective as 2 applications of 100 mgm. per sq. ft. or 4 applications of 56 mgm. per sq. ft. in the season.

Even in the unsprayed villages there was a decline in malaria due, perhaps, to some benefit from the sprayings in the other villages, though the decline was not so abrupt.

As the cost of the insecticide remains the same whether a single large dose is applied once or multiple smaller doses are applied more frequently, in the former case there is a considerable saving on the cost of labour and supervision.

The authors conclude that a single application of DDT at 100 mgm. per sq. ft. is economically the ideal treatment for malaria control in an area having a 6- to 7-months transmission period. [See also this *Bulletin*, 1952, v. 49, 118.]
H. S. Leeson

HADAWAY, A. B. & BARLOW, F. **Effects of Age, Sex and Feeding on the Susceptibility of Mosquitoes to Insecticides.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 438-43.

"1. In experiments on the effects of age, sex and feeding on the susceptibility of mosquitoes to certain insecticides, it was found that male *Anopheles stephensi* were more susceptible than females to DDT.

"2. The susceptibility of female *A. stephensi* and *Aedes aegypti* to DDT and dieldrin fluctuated in a regular manner through successive feeding-cycles, and was lowest 24 hours after a blood-meal.

"3. The susceptibility to DDT of female *A. aegypti* fed on human blood was not significantly different from that of females fed on guinea-pig blood."

ECHAVEZ, P. S. **A Multi-Outlet Pump used in the Taiwan Malaria Control Programme.** *Bull. World Health Organization.* Geneva. 1956, v. 15, Nos. 3, 4 & 5, 814-16, 1 fig.

RAMA RAO, R. & SIRSI, M. **Avian Malaria and B-Complex Vitamins.**

III. Para-Amino-Benzoic Acid. *J. Indian Inst. Sci.* 1956, Oct., v. 38, No. 4, 224-7 (Sect. A), 1 fig. [13 refs.]

It has been postulated that *p*-aminobenzoic acid (PAB) is an essential metabolite for organisms which are susceptible to the action of sulphonamides. Its influence on infections by different micro-organisms varies widely according to the nature of the infecting agent. It proved to be an essential metabolite for *P. knowlesi* [this *Bulletin*, 1945, v. 42, 867].

Quantitative determinations of PAB in the blood of normal and *P. gallinaceum*-infected chickens were undertaken while the course of infection with this parasite was followed. Experiments were carried out at the same time with birds on a PAB-deficient diet and during supplementation of the diet with this vitamin. The biological method of THOMPSON *et al.* (*J. Biol. Chem.*, 1943, v. 148, 281) in which *Neurospora crassa* is employed was used for estimation of PAB. Groups of birds were given the required diet before infection and the course of infection was followed in stained smears from the fourth day after infection. During the incubation period the PAB level of blood was raised and fell during patent infection. The length of the incubation period was inversely proportional to the PAB level of the blood. It was concluded that PAB was required for the different phases of development of the parasite. *J. D. Fulton*

SAUTET, J., GEVAUDAN, P., CAPORALI, J. & VUILLET, J. Nouvelles recherches sur l'influence de divers régimes préalables sur le traitement des affections expérimentales à *Plasmodium berghei* chez la souris blanche. [The Influence of Different Diets on Subsequent Infection with *P. berghei* in the Mouse] *Méd. Trop.* Marseilles. 1956, Sept.-Oct., v. 16, No. 5, 654-62. [10 refs.]

The authors [this *Bulletin*, 1956, v. 53, 155, 156] have shown that mice on a poor diet of bread and water remained uncured of infection with *P. berghei* by drugs till the diet was supplemented with milk. They were of the opinion that this was not a specific action of the milk and have now shown that the addition of other substances to the poor diet can produce a similar effect in experiments in which approximately 1,000 mice were used. The experimental diet was continued for 2-4 weeks before infection with *P. berghei*. When infection was apparent oral treatment with quinine, quinacrine [mepacrine], nivaquine [chloroquine] or Malocide [pyrimethamine] was given for different periods. The addition of fresh butter, milk (as previously found), calcium phosphate, and cod-liver oil or vitamin D to the basal diet after drug treatment aided survival. The addition of alcohol or wine to the basal diet in conjunction with drug treatment exercised an unfavourable effect on survival. The authors wonder whether the same conditions apply in human malaria.

J. D. Fulton

HUGHES, F. W. & TATUM, A. L. **Effects of Hypoxia and Intercurrent Infections on Infections by *Plasmodium berghei* in Rats.** *J. Infect. Dis.* 1956, July-Aug., v. 99, No. 1, 38-43, 5 figs.

Adult rats weighing about 100 gm. were inoculated with *Plasmodium berghei* and exposed at various intervals to the effect of hypoxia (corresponding to an altitude of 19,000 feet) in a decompression chamber. The course of parasitaemia was compared with that of rats kept at room altitude, and a striking difference was noted: the onset was more sudden, the density was greater and death occurred in the hypoxic rats. If the rats were placed in the decompression chamber (a) after the crisis, a temporary recrudescence occurred, or (b) during the crisis, more than half died and the remainder showed an increased parasitaemia.

Similar experiments were carried out in which an infection of *Trypanosoma lewisi* was substituted for hypoxia, and again the additional stress caused an augmentation of parasitaemia with occasional fatalities in the doubly infected rats. The malaria also influenced the course of the *T. lewisi* infection, the number of trypanosomes remaining high instead of declining.

Depression of function of the reticulo-endothelial system is thought to be the cause of the persistence or heightening of infections in the presence of hypoxia or intercurrent disease.

[See also this *Bulletin*, 1955, v. 52, 128; 1956, v. 53, 1208, where GEIGY and FREYVOGEL showed the effect of high altitudes on *P. gallinaceum*.]

P. C. C. Garnham

MOLINARI, V. & MONTÉZIN, G. Sur le comportement de trypanosomes et de plasmodies soumis aux basses températures de la neige carbonique et de l'azote liquide. [**Behaviour of Trypanosomes and Plasmodia after Exposure to Freezing Temperatures**] *Bull. Soc. Path. Exot.* 1956, May-June, v. 49, No. 3, 445-50.

Using techniques described in another paper dealing with amoebae [see Molinari, below, p. 571], the authors exposed citrated blood containing malaria parasites (*Plasmodium berghei*, *P. gallinaceum*, *P. relictum*) and trypanosomes (*T. brucei*, *T. cruzi*, *T. gambiense*, *T. congolense*, *T. equiperdum*, *T. equinum*, *T. evansi*) to temperatures of -180°C . (liquid nitrogen) and -79°C . (carbon dioxide snow) for different periods of time, after which the frozen globules were thawed at $+37^{\circ}\text{C}$. and inoculated into susceptible animals.

The results were as follows: *P. berghei* remained infective to mice after exposure to -79°C . and -180°C . for 1 hour; after exposure to -180°C . for 1 hour, *P. relictum* failed to infect canaries and *P. gallinaceum* to infect fowls. All the trypanosomes, except *T. gambiense* and *T. cruzi*, remained motile after exposure to -180°C . for 1 hour, but while *T.*

brucei, *T. congolense* and *T. evansi* were infective to rodents, the remaining trypanosomes were unable to infect them. [See also this *Bulletin*, 1957, v. 54, 405, 429.] C. A. Hoare

VERAIN, Alice & VERAIN, A. Influence des ultrasons sur *Plasmodium berghei*. [**Ultrasonic Action on *Plasmodium berghei***] *C.R. Soc. Biol.* 1956, v. 150, No. 6, 1189-90.

Rat blood containing *Plasmodium berghei* was progressively citrated while exposed to ultrasonic action (by means of a Dutertre megatone). Haemolysis of the blood occurred after various intervals (3 to 10 minutes). At this time practically all the parasites were extracellular, and if the ultrasonic action were prolonged for 40 minutes nearly all the parasites had disappeared, after having undergone a progressive deformation with extrusion of the nuclei. It was shown by subinoculation of the treated blood that the parasites were still viable after 15 minutes' exposure to the ultrasonic effect. P. C. C. Garnham

FABIANI, G. & ORFILA, J. Recherche du pouvoir séro-protecteur chez le rat infecté expérimentalement par *Plasmodium berghei*. [**Studies on the Effect of Immune Serum on the Rat experimentally infected with *Plasmodium berghei***] *C.R. Soc. Biol.* 1956, v. 150, No. 6, 1182-4.

54 young rats weighing 50 gm. were partially exsanguinated in order to produce an excessive reticulocytosis. They were then given (a) 1 ml. serum taken from rats at various stages of immunity and (b) an hour later 30 million erythrocytes infected with *Plasmodium berghei*. Reticulocyte and parasite counts were then made twice daily for 4 days: protection was apparent if few parasites were visible in the presence of numerous reticulocytes, the result was considered doubtful if there was a slowly increasing parasitaemia, and absence of protection was shown by densities comparable to those of the controls. The serum conferred no protection if it were obtained from rats in the acute stage of the disease, or even during the crisis, but immunity became evident about the 10th day of latency and lasted at least 6 months.

[See also this *Bulletin*, 1952, v. 49, 602, when VARGUES *et al.* showed that complement-fixing antibodies appeared as early as at the time of the crisis.] P. C. C. Garnham

VASINA, S. G. [**Testing of Chemotherapeutic Agents against Tissue Forms of *Plasmodium gallinaceum* in Chick Embryos**] *Med. Parasit. & Parasitic Dis.* Moscow. 1956, v. 25, No. 4, 327-30. [In Russian.]

The author describes screening tests of various drugs carried out on chick embryos infected with *Plasmodium gallinaceum*. For this purpose 2 drops

of a suspension of infected chick brain or embryo were inoculated on the chorio-allantoic membrane of 7-11-day-old embryos. In some experiments the drug to be tested was mixed in various dilutions with the inoculum, in others it was added before or after inoculation of the parasites. The aperture of the eggs was then sealed and they were incubated at 37-38°C.

Among the drugs tested were Acrichin [mepacrine], aureomycin, Chinocid [an 8-aminoquinoline], sulphadiazine and Bigumal [proguanil]. The results of the experiments were assessed after 9-10 days by examination of touch-smears of the infected embryos, and by examination of chicks hatched from the eggs: in both cases the presence of EE forms was sought for. The only drugs which eliminated the EE forms were sulphadiazine (1 in 1,000) and aureomycin (6 in 1,000 and 10 in 1,000), though in some cases the latter only retarded the infection for several days, whereas the other drugs were ineffective.

C. A. Hoare

BLACKWATER FEVER

TROWELL, H. C. & VAIZEY, J. M. **Treatment of Blackwater Fever with Prednisone.** *Lancet*. 1956, Dec. 22, 1281-2.

Cortisone and related substances have been reported to be valuable in the treatment of blackwater fever. In the cases under review the authors used Prednisone, which is closely allied to cortisone. The drug was administered to 3 Africans (aged 60, 6 and 1½), and two Asians (aged 40 and 23) during attacks of haemoglobinuria diagnosed as blackwater fever. One of the Africans developed haemoglobinuria 3 days after a surgical operation and blood transfusion. The authors consider this interval long enough to exclude incompatible transfusion. One patient was being treated with quinine (plus mepacrine and penicillin) when haemoglobinuria developed. The infant had a history of irregular treatment with quinine. One Asian had a history of blackwater fever 13 years previously.

The clinical state in these patients improved within a few hours and the haemoglobin cleared from the urine within a few days of the commencement of treatment. Total dosage ranged from 40 to 150 mgm. Prednisone, spread over 1 to 7 days; the infant was given 20 mgm. followed later by 10 mgm., in one day. The authors found the response prompt and satisfactory and recommended the use of Prednisone or cortisone in every case of blackwater fever. It is to be noted, however, that the cases described were not complicated.

The authors state that the diagnosis was established by the presence of methaemalbumin in the serum of every case. This finding is not specifically mentioned in the individual case reports, but in Case 3 it is noted that "urine and serum contained methaemoglobin spectroscopically".

[If this were the case it is, to the abstracter's best belief, the first report of the presence of methaemoglobin in the serum in blackwater fever since Fairley's demonstration of methaemalbumin, which had so often been mistakenly labelled methaemoglobin in the past.] *B. G. Macgrath*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

See also p. 536, MOLINARI & MONTÉZIN. Sur le comportement de trypanosomes et de plasmodies soumis aux basses températures de la neige carbonique et de l'azote liquide. [**Behaviour of Trypanosomes and Plasmodia after Exposure to Freezing Temperatures**]

See also p. 626, GÂNDARA, I. Contribuição para a elaboração da carta de Glossinas de Angola. [**Data on Glossina in Angola**] II. Subsídio para o estudo dos "Culicidae" (Diptera) de Angola. [**Additional Data on Mosquitoes in Angola**] III. Subsídio para o estudo dos "Culicidae" (Diptera) de S. Tomé e Príncipe. [**Additional Data on Mosquitoes of S. Tomé and Príncipe**]

DEPOUX, R., MERVEILLE, P. & CECCALDI, J., with the technical collaboration of BLANCHOT. Étude de la réaction de fixation du complément dans la trypanosomiase humaine. [**A Study of the Complement-Fixation Test in Human Trypanosomiasis**] *Ann. Inst. Pasteur.* 1956, Nov., v. 91, No. 5, 684-92.

The authors record their experience of the use of the complement-fixation test in human trypanosomiasis using an antigen prepared from *Trypanosoma equiperdum* according to the technique described by SCHOENAERS *et al.* [this *Bulletin*, 1953, v. 50, 1023; 1954, v. 51, 543]. It was found that the test was specific for trypanosomiasis. In 127 cases where trypanosomes were present, positive tests were found in every case except one, whereas 20 normal controls and 20 cured patients gave completely negative results. There was no correlation between the height of the titres and the clinical state or the presence or absence of trypanosomes in the blood or lymph glands.

Under treatment early cases show evidence of clinical cure before the complement-fixation test reverts to negative but in late cases a negative

complement-fixation test frequently precedes clinical cure. In cases resistant to chemotherapy the complement-fixation test remains positive. In relapses the test shows a return to positivity.

In late treated patients the complement-fixation test helps to distinguish those in whom the infection persists from those with residual symptoms after cure. The test may also detect cases where prophylactic pentamidine has made it difficult to demonstrate a trypanosome.

Frederick J. Wright

BUTLER, G. C., DUGGAN, A. J. & HUTCHINSON, M. P. **Melarsen in the Treatment of *Trypanosoma gambiense* Infection in Man.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 69-74. [11 refs.]

Continuing earlier studies in West Africa [this *Bulletin*, 1951, v. 48, 957] on the use of Melarsen (disodium *p*-2:4-diamino-1:3:5-triazinyl-6-aminophenylarsonate) in the treatment of *Trypanosoma gambiense* infections of man the authors record the results of the treatment of a further 292 patients, 244 of whom have been watched for 2 years after the treatment. Controls were afforded by series of similar patients treated either with antrypol and tryparsamide or pentamidine and tryparsamide. The cases were classified according to the state of the cerebrospinal fluid.

The dosage of Melarsen used ranged from 40 mgm./kgm. given on 3 occasions to 15-20 mgm./kgm. given on 12 occasions; it became evident that the size of the individual dose of Melarsen, rather than the length of the course of injections, influenced the incidence of toxic reactions to the drug. The state of the patient had no significant bearing on the degree of toxicity. A dosage of 15-20 mgm./kgm. appears to be the maximum permissible for field use, and is safe for this purpose.

Of 46 early and previously untreated cases first treated solely with Melarsen 96% were cured; of 71 intermediate but otherwise similar cases 84% were cured; and of 49 advanced and similar cases 63% were cured. These figures contrast with 91% cured of 33 similar early cases given antrypol and tryparsamide, 81% of 54 intermediate cases, and 38% of 42 advanced cases likewise treated. With pentamidine and tryparsamide 78% of 37 previously untreated early cases, 74% of 35 intermediate, and 11% of 9 advanced cases were cured. Melarsen treatment was used for 10 intermediate relapse cases and 70% of them were cured, and for 37 advanced relapse cases previously treated up to 8 times with antrypol and tryparsamide; of these 38% were cured. Of 2 intermediate and 10 advanced similar cases again treated with antrypol and tryparsamide none were cured.

For the treatment of advanced cases, therefore, Melarsen has proved considerably more effective than were the standard courses containing tryparsamide. With the latter only one in 3 advanced cases are likely to be cured, whereas with Melarsen the corresponding figure is 56%, when

the dosage is 20 mgm./kgm., and 71% when it is 30 mgm./kgm.: the latter dose should, however, be used only under medical supervision. The steady and consistent improvements in the cell count and protein content of the cerebrospinal fluid confirm the value of this drug in advanced cases of sleeping sickness.

A. R. D. Adams

APTED, F. I. C. **Four Years' Experience of Melarsen Oxide/BAL in the Treatment of Late-Stage Rhodesian Sleeping Sickness.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 75-86. [34 refs.]

Following his initial work in Tanganyika [this *Bulletin*, 1954, v. 51, 152] on the use of Mel B (Melarsen oxide/BAL) for the treatment of *Trypanosoma rhodesiense* infections the author has extended his knowledge of it by a further 4½ years' experience. Of the 33 patients recorded in the original report 3 were lost sight of; 5 have died (2 during treatment and 3 during relapses); 24 are well (4 after a second course of treatment given on relapse); and another has survived though relapsed and resistant to treatment. The duration of observation in the majority of the surviving cases has been from 2½ to 4 years. Had Mel B not been available it is reasonably certain that none of these patients would have survived to date; moreover at least half of them presumably have been cured.

The total of late-stage cases treated with the drug now reaches 176. Among these there have been 21 deaths, of which 3 probably were not connected with the disease; the death-rate, therefore, has been just over 10%, and this in spite of the fact that the patients when treated were all in an advanced stage, in very poor condition, and in some cases almost moribund. Of the 18 whose deaths were ascribable to the disease, or to the treatment, 5 relapsed and one died 3 months after treatment—presumably from the disease. The other 12 died during treatment, and all were gravely ill at its start; in only one of these cases was death ascribable to the treatment, in 3 others the drug rather than the disease may have been the cause of it. The other 8 deaths were due to "failure to respond to treatment".

18 patients (about 10%) relapsed after treatment with Mel B, and 5 of them died. 3 patients have proved resistant to treatment, and one of these has died; possibly too low an initial dosage accounted for the resistance developed by 2 of them.

The effects of various courses of treatment with Mel B have been analysed in some detail; the data are set out in a series of tables. These should be consulted in the original by those interested in the subject. When patients are in very poor condition and very acutely ill, previous suramin treatment may produce a "tonic" effect which will enable the patient better to withstand a course of Mel B treatment. This is not always the case; in any event, if immediate improvement is not evident suramin treatment should be abandoned.

If the dosage of Mel B is carefully regulated according to the individual

patient's condition and his response to the treatment the drug affords a most valuable and a safe treatment for advanced stage *T. rhodesiense* infections. If proper attention is paid to the patient's condition and his response to treatment toxicity is not a serious problem in Mel B treatment. A notable effect of treatment with this drug is the extraordinary improvement in the mental condition of those showing marked mental abnormality or mental dullness before the treatment; curative treatment of late stage sleeping sickness does not entail subsequent overcrowding of mental hospitals.

A. R. D. Adams

FULTON, J. D. & GRANT, P. T. **Experiments on the Mode of Action of Stilbamidine.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 381-4.

Washed *Trypanosoma rhodesiense* of the "Maun" strain were exposed *in vitro* to a concentration of 20 μ gm./ml. of stilbamidine for 2 hours at 37°C., and injected intravenously into rats. They failed to multiply and gradually disappeared. When injected after only 1 hour of exposure to the drug, a short parasitaemia was usually produced, which did not kill the rat. The disappearance of the parasites coincided with the development of agglutinating and lytic antibodies in the serum of the host which were effective against the normal strain of trypanosomes and also against its atoxyl- and stilbamidine-resistant variants. The authors conclude that when exposed to the drug *in vitro*, some or all of the parasites take up a lethal quantity. The doomed parasites die, and stimulate an immune response in the host which controls the parasitaemia produced by any trypanosomes which have remained viable. The drug acts directly on the trypanosomes, and there is no evidence for the production of a more potent metabolite in the tissues of the host.

L. G. Goodwin

PACKCHANIAN, A. **Chemotherapy of African Sleeping Sickness. II. Chemotherapy of Experimental *Trypanosoma gambiense* and *Trypanosoma rhodesiense* Infections in Mice (*Mus musculus*) with a New Antibiotic, Amphomycin.** *Antibiotics & Chemotherapy.* New York. 1956, Dec., v. 6, No. 12, 684-91.

Amphomycin, a new antibiotic from *Streptomyces* species, has a polypeptide structure and is predominantly active against Gram-positive bacteria. Previously antibiotics were found inactive against *T. cruzi* infections in mice [*this Bulletin*, 1953, v. 50, 612] and this report deals with tests against infections of *T. gambiense* and *T. rhodesiense* in the same host. The antibiotic was used chiefly as sodium salt which is soluble and stable in aqueous solutions; in a smaller number of cases the calcium salt was also used. The LD50 for mice treated intraperitoneally is about 250 mgm./kgm. and about half that by the intravenous route.

As much as 1600 mgm./kgm. can be given to mice over a period of 4 weeks without untoward effects.

Over 600 mice were used in these experiments, batches of 5 to 40 animals being treated with each dosage. Occasionally the calcium or sodium salts of the antibiotic were used for oral treatment, but the drug appears to be poorly absorbed from the intestinal tract. Treatment was begun when trypanosomes were scanty in the blood. Regular examinations of blood were made up to 8 weeks or longer after treatment and if still negative cure was presumed.

The drug sometimes exerted a trypanocidal effect with blood clearance as early as 3 hours after administration. It had a definite curative effect in both infections, being apparently more active against *T. rhodesiense*. The same quantity of drug given over several days was more effective than when given as a single dose. The curative dose of Amphomycin for mice was found to range between 100 to 150 mgm./kgm. body weight when administered on 4 successive days.

[For Part I, see this *Bulletin*, 1956, v. 53, 31.] J. D. Fulton

HOCKING, K. S. & YEO, D. **Aircraft Applications of Insecticides in East Africa. XI.—Applications of a Coarse Aerosol to control *Glossina morsitans* Westw. at Urambo, Tanganyika, and *G. morsitans* Westw. and *G. pallidipes* Aust. in Lango County, Uganda.** *Bull. Entom. Res.* 1956, Dec., v. 47, Pt. 4, 631-44, 4 figs. [10 refs.]

“Two experiments are described where applications of coarse aerosols have been made to areas of savannah woodland infested with tsetse flies (*Glossina* spp.).

“The applications were made at nominal dosages of 0.25 gallons per acre, which was equivalent to either 0.20 lb. of p,p’DDT per acre, or 0.03 lb. of γ BHC per acre. The coarse aerosols had mass median diameters of approximately 60 microns.

“In one experiment, carried out at Urambo, Tanganyika, a reduction of 95 per cent. was obtained in populations of *G. morsitans* Westw. This kill was somewhat lower than in many other experiments, a fact that can be attributed mainly to our inability to maintain the cycle of applications. Immigration of flies into the treated area caused a relatively rapid increase in fly numbers to levels comparable to the pre-treatment populations, and in this respect the experiment was a failure.

“The other experiment, in Lango County, Uganda, was highly successful, and reduced a population of *G. morsitans* to 0.05 per cent. of its pre-treatment level, and eradicated a small population of *G. pallidipes* Aust. It is indeed likely that no stable population now exists in the area, and that the very few flies caught there since the end of the applications have been wanderers from other infested woodland. The continued success of the experiment is considered to be due to the effective isolation of the area.

"Some brief comments are made upon the costs of the method, and on its value under conditions of land development in Africa."

GORDON, R. M., CREWE, W. & WILLETT, K. C. **Studies on the Deposition, Migration, and Development to the Blood Forms of Trypanosomes belonging to the *Trypanosoma brucei* Group. I.—An Account of the Process of feeding adopted by the Tsetse-Fly when obtaining a Blood-Meal from the Mammalian Host, with special reference to the Ejection of Saliva and the Relationship of the Feeding Process to the Deposition of the Metacyclic Trypanosomes.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 426-37, 11 figs. on 3 pls. & 4 text figs. [12 refs.]

This fascinating account of the functioning of the mouth-parts of tsetse flies (*Glossina morsitans*) as they feed on a mammal (mouse or guineapig) is derived from direct observation of the act under a microscope with a specially designed apparatus. This is described and figured. Colour ciné film was also exposed with the same apparatus and proved valuable on repeated showing for observation and interpretation. Serial sections of sites of bites, with and without mouthparts *in situ*, were also informative.

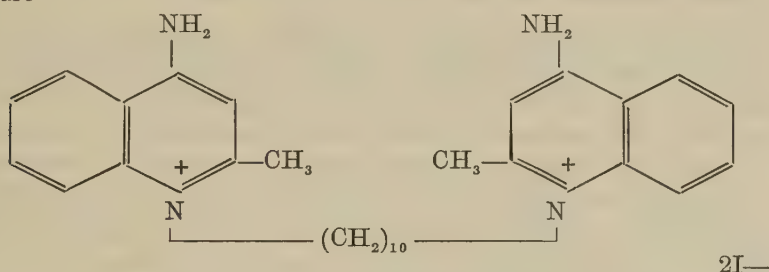
When the fly has selected a place to feed (on the ear of the host in the special apparatus), the labium is swung down vertically and the labella everted. Passage through the skin appears to be done by very rapid alternating eversion and inversion of the labella so that the teeth and rasps cut through the tissues. Once the stratum corneum is penetrated, further penetration is more rapid and the fascicle (labium and hypopharynx) appears to be pulled along by the cutting activity of the labella rather than pushed on by pressure from the fly. The fascicle may cut a capillary and feeding commence, or it may probe about freely in the tissues first before this happens. In probing, the fascicle is able to bend so much as to be J-shaped. Minor haemorrhages may result from this probing. Once a capillary is satisfactorily lacerated a fly applies the fascicle and labella close to the opening and sucks up the blood as rapidly as it flows out. It is after the completion of feeding and when the fascicle is withdrawn that a considerable amount of blood accumulates in the inter-capillary tissue. At all times after the start of penetration of the stratum corneum, saliva is repeatedly ejected so that it must occur in the tissues (and may infiltrate beyond the limits of exploration of the fascicle), in haemorrhages, and pass into capillaries, besides being ingested by the fly as it sucks the blood. These are noted as interesting realities in terms of the transmission of metacyclic trypanosomes by the salivary route.

A detailed summary of the structure and functioning of the mouthparts takes the form of considerable quotations from Buxton's recent memoir on tsetse fly [this *Bulletin*, 1955, v. 52, 853]. The photographs illustrate, with remarkable clarity for such a difficult photographic subject, the

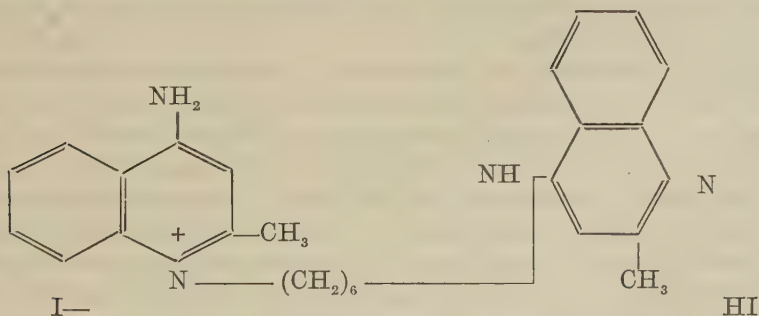
flexures of the fascicle, the action of the labella, the ejection of salivary fluid within the tissues, and the mode of action of feeding on a capillary and the subsequent formation of a haemorrhage. *D. S. Bertram*

AUSTIN, W. C., COLLIER, H. O. J., POTTER, M. D., SMITH, G. K. A. & TAYLOR, E. P. **A New Compound Active against *Trypanosoma congolense* and *T. vivax*.** *Nature*. 1957, Jan. 19, v. 179, 143-4.

Decamethylene bis (*iso*-quinolinium bromide), because of its availability, type of chemical structure and activity, was chosen as a starting point for the preparation of symmetrical trypanocides with large end-groups. The related substance decamethylene bis (4-aminoquinolindinium iodide) of structure



proved active against *T. rhodesiense* infections in mice and possessed antibacterial and antifungal activity. On preparing what was believed to be the corresponding substance containing 6 $-CH_2$ groups, activity against *T. congolense* infections in mice was observed. Crystallization and chromatographic analysis of the product showed, however, that the most active substance of the three or four formed in the reaction had the following unsymmetrical constitution



This finding confirmed as in the case of phenanthridinium compounds and antrycide that unsymmetrical structures appear to be particularly active against *T. congolense*, whereas symmetrical types are active against *T. rhodesiense*. In mice the new compound is stated to be more active than antrycide against mouse infections of *T. congolense* and *T. vivax*,

besides being less toxic. It also possesses prophylactic action against the former infection in mice. When mixed with suramin (Antrypol) the period of protection was lengthened.

J. D. Fulton

I. BOUISSET, L., HARANT, H. & RUFFIÉ, J. Hibernation et parasitisme. [**Hibernation and Parasitism**] *Montpellier Méd.* 1956, May, v. 49, No. 5, 494-7.

II. ———, ——— & ———. Action de l'hibernation expérimentale sur l'évolution de *Trypanosoma equiperdum* (Doflein 1901) chez le rat blanc. [**Effect of Experimental Hibernation on the Course of *Trypanosoma equiperdum* Infection in Rats**] *C.R. Soc. Biol.* 1956, v. 150, No. 6, 1277-80, 1 diagram.

It is well known that, as a rule, a parasite is well adapted to the normal hostal environment. However, changes in the physiological equilibrium of the host (such as dietary deficiencies or temperature variation), though tolerated by the host itself, may have an adverse effect upon its parasites.

I. In the first paper the authors describe the effect of "hibernation" in albino rats upon the course of infection with *Trypanosoma equiperdum*. A state corresponding to hibernation was induced in the animals by intramuscular injection of 0.5 cc. of a sedative mixture containing one volume of Largactil [chlorpromazine] (0.025 gm. per 5 ml.) and half volumes each of Dolosal (0.1 gm. per 2 ml.) and Phénergan (0.05 gm. per 2 ml.). The injection caused a rapid fall of the temperature to about 30°C. and a somnolent condition in the rats.

The experiment was carried out with 6 infected animals: 2 untreated controls, 2 drugged one hour after inoculation of the trypanosomes and 2 after 48 hours. The results for observations extending from 3 to 95 hours after inoculation are shown in a table, from which it is seen that parasitaemia was considerably reduced in rats which were drugged shortly after inoculation of the parasites, whereas in those treated 2 days later the course of infection did not differ markedly from that in the controls.

II. In the second paper the authors record further experiments on the effect of induced hibernation on the course of infection with *T. equiperdum* in rats, in which 25 animals (10 controls and 15 treated) were employed, with the same methods as in the first series. The results were the same as in the preceding experiments, showing that in rats treated with the sedative mixture the development of parasitaemia was retarded and the animals survived for a longer period (84-96 hours) than the controls (60-72 hours). The results were subjected to statistical analysis, which confirmed their significance.

C. A. Hoare

See also p. 590, TAKAGI, Responses of Adrenal Cortex under the Experimental Parasitic Invasion.

GARNHAM, P. C. C. **Isolation of a New Strain of *Trypanosoma cruzi*.**
[Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956,
Nov., v. 50, No. 6, 613.

The author describes a new strain ("Sonya") of *Trypanosoma cruzi* isolated by him in Brazil by feeding clean *Triatoma infestans* on a 3-year-old girl, who had a chagoma of 6 weeks' duration on her ankle. The infected bugs were brought to England, where their droppings were inoculated intraperitoneally into mice, in which (as well as in bugs) the strain has since been maintained in the laboratory. In syringe passages the trypanosomes appear in the blood after 10–15 days, then parasitaemia increases to 30–40 per field, and the mice die 2–3 weeks later in an oedematous condition. Abundant intracellular forms are found in the heart 10 days after the onset of parasitaemia. Nymphs of *T. infestans* are readily infected, with metacyclic trypanosomes appearing in the rectum after 10 days: these forms are infective to young mice after intraperitoneal inoculation, with an incubation period of about 15 days. C. A. Hoare

ROMAÑA, C. Acerca del ciclo evolutivo del *Trypanosoma* (*Schizotrypanum*) *cruzi* Chagas 1909, en sus fases tisular y hemática. [**Life Cycle of *Trypanosoma cruzi* in the Tissues and Blood**] *Mem. Inst. Oswaldo Cruz.* 1956, June, v. 54, No. 1, 255–69, 5 figs. [18 refs.] English summary. Also in *An. Inst. Med. Regional. Tucuman, Argentina.* 1955, Dec., v. 4, No. 2, 155–71, 5 figs. [18 refs.] English summary.

There has been a long-standing controversy regarding the course of development of *Trypanosoma cruzi* in the tissues of the mammalian host. In the two papers [the text of which is identical] the author first gives a critical review of the life-cycle of this trypanosome as described by previous observers, after which he turns to his own observations, which were based primarily on fresh and stained preparations of tissue-cultures in chick embryos, and were supported by material from experimentally infected monkeys and tuco-tucos [South American rodents of the genus *Ctenomys*].

According to the author's observations, the life-cycle of *T. cruzi* proceeds as follows. When tissue cultures are inoculated with metacyclic or blood trypanosomes, the flagellates penetrate into the host-cells in which they may develop in two different ways: (a) by "fusiform regression", in the course of which the body of the trypanosome gradually becomes broader and shorter and the kinetoplast migrates to the anterior end, while its flagellum is rapidly reduced in length, until—by the end of 24 hours—the parasite assumes the leishmanial stage; (b) by "orbicular regression", when the body of the trypanosome is folded on itself, thereby assuming the leishmanial form. In the leishmanial stage the parasite divides repeatedly by binary fission until the host-cell is filled with the rounded forms, after which they are again transformed into trypanosome forms.

This development also proceeds along two lines: (a) by "fusiform progression", when the rounded parasite gradually elongates and its flagellum grows out, while the kinetoplast gradually migrates backwards, so that—before reaching the trypanosome stage—the flagellate also passes through a crithidial stage; (b) by "orbicular progression", in the course of which the growing flagellum encircles the rounded parasite, in the body of which a groove is formed, which increases in depth until a trypanosome form is produced by "unfolding" of the body, but without change in the position of the kinetoplast. In the author's opinion, the first type of "progressive" development gives rise to the thick blood trypanosomes, whereas the thin trypanosomes are produced by the second type.

The papers are illustrated by schematic figures.

C. A. Hoare

ZWICKY, K. & WIGGLESWORTH, V. B. **The Course of Oxygen Consumption during the Moulting Cycle of *Rhodnius prolixus* Stål (Hemiptera).** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1956, Dec. 31, v. 31, Pts. 10/12, 153–60, 4 figs. [24 refs.]

CHAFFEE, E. F., FIFE, E. H., Jr. & KENT, J. F. **Diagnosis of *Trypanosoma cruzi* Infection by Complement Fixation.** *Amer. J. Trop. Med. & Hyg.* 1956, Sept., v. 5, No. 5, 763–71. [21 refs.]

The authors describe an improved method for carrying out the complement-fixation test for the diagnosis of Chagas's disease. The preparation of antigen involves two processes: (a) desiccation of the trypanosomes and (b) extraction of antigen from them. For this purpose the fluid overlays of cultures of *Trypanosoma cruzi* in diphasic (blood-agar + Locke's solution) medium, grown in 500 cc. flasks, were pooled in a 4 litre flask, after which the trypanosomes were concentrated by repeated centrifugation (at 5°C.) and washing of saline suspensions of the sediments. The final trypanosome-containing sediment was transferred with a minimum of saline to a 10 ml. ampoule, which was frozen in a mixture of solid CO₂ and ethylene glycol monomethyl ether (–78°C.), and then dehydrated from the frozen state in the course of 16–18 hours, after which the ampoule was sealed and stored in cold (at –55° to –45°C.).

The finished antigen was prepared by extracting the dried trypanosomes with anhydrous ether at –15° to –18°C., after which extraction was continued in alkaline buffer. The suspension resulting from the last extraction was centrifuged and the supernatant fluid, containing the antigen, was poured into 10 ml. ampoules, the contents of which were frozen in solid CO₂, dehydrated, sealed and stored in cold (at –55° to –45°C.). For use in the CF test the antigen was rehydrated with 1 ml. distilled water. The antigen remained stable for up to 2 years.

The *T. cruzi* antigen was tested with sera from the following sources: (a) 96 patients suffering from Chagas's disease; (b) 21 cases of American

cutaneous leishmaniasis (*Leishmania braziliensis*); (c) healthy donors (50 sera); and (d) syphilitic patients (15 sera). Complement-fixing antibody was demonstrated in 98% of the sera from cases of Chagas's disease and in 19% of those with leishmaniasis, but not in the sera of normal or syphilitic subjects.

C. A. Hoare

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

DOURY, P. A propos de deux cas autochtones de leishmaniose générale (kala-azar méditerranéen) observés au Hoggar (Sahara central). [**Two Cases of Local Origin of General Leishmaniasis (Mediterranean Kala Azar) observed in the Hoggar Region (Central Sahara)**] *Arch. Inst. Pasteur d'Algérie*. 1956, Sept., v. 34, No. 3, 370-79, 2 pls. [14 refs.]

The author believes these 2 case-histories of general leishmaniasis (Mediterranean kala azar) in 2 children of the Hoggar region to be worth noting because the disease, extremely rare in the Sahara, had never before been recorded.

There are only sporadic cases as all children in the region are regularly given a thorough medical examination. Since the splenic index is about 0, there can be no question of undiscovered cases.

To the few cases of oriental sore which the author has reported are added these 2 cases of kala azar of local origin to underline the role of *Phlebotomus* in the pathology of the Hoggar region. [See also this *Bulletin*, 1956, v. 53, (1413).]

John Rathborn

DEANE, L. M. & DEANE, M. P. Encontro de cães naturalmente infetados por *Leishmania donovani*, no Ceará. [**Dogs naturally infected with *Leishmania donovani* in Brazil**] *Hospital*. Rio de Janeiro. 1954, June, v. 45, No. 6, 703-7.

Whereas in the case of visceral leishmaniasis of the Mediterranean area and Soviet Middle Asia the role of dogs as reservoir hosts is firmly established, in Brazil their epidemiological importance has not yet been elucidated.

The authors record the first findings of canine infection in an endemic area of the State of Ceará. An examination of smears obtained by liver puncture and from skin lesions revealed the presence of *Leishmania donovani* in 8 out of 72 dogs: in 4 of these the parasites were detected

in both sites, in 2 only in the liver and in 2 only in the skin. On autopsy of infected dogs parasites were found to be most numerous in the spleen and bone-marrow. It is concluded that in the area in question dogs represent important reservoir hosts of human kala azar. In a previous paper [this *Bulletin*, 1955, v. 52, 884] the authors incriminated local foxes (*Lycalopex vetulus*) as wild reservoirs of this disease: they now report the finding of leishmanial infection in 2 more animals (out of 5 foxes examined).

C. A. Hoare

GUPTA, S. P. & GUPTA, N. P. **Some Observations on Kahn's Universal Serologic Reaction.** *J. Indian Med. Ass.* 1956, Nov. 1, v. 27, No. 9, 309-13, 6 figs.

The Kahn universal serological reaction does not seem to have aroused the interest it deserves. These authors tested sera from normal persons and from patients with syphilis, leprosy, eosinophilia and suspected kala azar. Results are set out in 6 figures which cannot be shown in an abstract. Of 70 healthy people 18 showed no flocculation and 52 some flocculation in the first or second zones or both after cold incubation. All 15 syphilitic patients showed flocculation increasing after 24 hours in the middle zone. Of 76 patients with tropical eosinophilia 12 showed no flocculation and 64 some flocculation in the first or second zones or both after cold incubation. Of 106 leprosy patients (16 lepromatous and 90 neural) 39 showed no flocculation, 49 flocculation after cold incubation and 18 flocculation before and after cold incubation. Of 52 patients with splenic enlargement, 17 with a positive aldehyde test showed flocculation in the first zone, while of 35 with negative aldehyde tests 9 showed no flocculation, 15 flocculation after 4 and 24 hours and 11 flocculation in the first zone before and after cold incubation.

Results indicated less flocculation in normal subjects than recorded by Kahn; in 17 cases of eosinophilia with a positive Wassermann reaction only 6 gave a typical universal syphilis pattern; in cases of leprosy flocculation was much less marked especially in the neural type but the syphilitic pattern was mostly seen in sera which gave positive Kahn reactions; in kala azar flocculation without cold incubation was found when the aldehyde test was positive but was absent in 65% of cases giving a negative aldehyde reaction.

It is concluded that the universal reaction may be helpful in cases of kala azar, eosinophilia and leprosy where serological tests for syphilis are suspected to be falsely positive.

T. E. Osmond

See also p. 532, ARSOV, Les effets de l'adrénaline intraveineuse dans les hypersplénies du paludisme et du kala-azar. [**The Effects of Intravenous Adrenaline in the Splenomegalies of Malaria and Kala Azar**]

KELLINA, O. I. [**Cutaneous Leishmaniasis of the Third Eyelid**] *Med. Parasit. & Parasitic Dis.* Moscow. 1956, v. 25, No. 4, 313-17, 2 coloured figs. on pl. [In Russian.]

The author describes an infection of her "third eyelid" contracted accidentally in the course of inoculation of a mouse with a 32-day-old culture of *Leishmania tropica* of the "moist type". The infection was characterized by a long incubation period (7 months), after which a nodule appeared on the semi-lunar fold; it continued developing, with the formation of an ulcer, and terminated by cicatrization about 8 months after the onset of symptoms, without causing any destructive changes. Scrapings of the lesion revealed typical Leishman-Donovan bodies, which were successfully grown in cultures.

The paper is illustrated by two excellent coloured photographs of the eye, showing the lesion at different stages of its development.

C. A. Hoare

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

KOSTRZEWSKI, J. Typhus exanthématique sporadique en Pologne. [**Sporadic Exanthematic Typhus in Poland**] *Ann. Inst. Pasteur.* 1956, Dec., v. 91, Suppl., 15-24, 7 figs. [20 refs.]

This is a description of a study of louse-borne typhus in Poland during the 3 years 1952-1954. A preliminary survey had shown that the disease was occurring in mild sporadic form; the attacks were often atypical, lasting 7-10 days in some cases and with a scanty rash or even no rash at all, occasionally. Six strains of *Rickettsia prowazeki* were isolated, 3 of them from patients attacked for the second time. Many of the patients said that they had suffered from previous attacks some years previously.

The plan of aetiological and epidemiological investigation consisted of serological tests of all patients admitted to the infectious diseases hospitals in Poland. The tests were made on a uniform system at the central laboratories and the criteria for a positive diagnosis were either a Weil-Felix reaction at a titre of 1 in 200 or a complement-fixation reaction at 1 in 50. Both tests were positive in about half the cases.

The total number of cases confirmed during the 3 years was 795; these were classified in 3 groups as follows:—

Group A. 74 cases, in which the source of infection was definitely known. None of these patients was known to have had a previous attack and the Weil-Felix reaction was positive in 91.8% of the cases.

- Group B. 194 cases, in which the source of infection could not be discovered but contagion could not be excluded. The Weil-Felix reaction was positive in 61·3% of the cases.
- Group C. 527 cases, in which any possibility of a recent infection from outside is said to have been excluded. The Weil-Felix reaction was positive in 48·2% of these patients; this low percentage suggests that most of them had suffered from previous attacks, known or unknown, and had been harbouring a latent infection whose recrudescence gave rise to the present attacks.

Personal enquiries revealed that 295 of the 721 patients belonging to Groups B and C had suffered from previous attacks most of which had occurred 10 to 20 years earlier. The percentage of positive Weil-Felix reactions among these cases of recrudescence was 43·4, a figure not much lower than the figure 48·2 observed among the 527 patients of Group C and therefore suggesting that there may have been a considerably larger number of previous attacks than were known to the patients.

The author subscribes to the generally accepted view that typhus fever is maintained during inter-epidemic periods in the form of persistent latent infection which occasionally flares up and gives rise to fresh foci of infection. It is, however, remarkable that although at least 295 cases of such recrudescence have been detected there is no mention of contact infection having been conveyed to other persons from any of these patients. The author's recommendation that further study should be made of chronic latent infection will receive much wider support than his advocacy of prevention by vaccination with a living avirulent strain of *Rickettsia prowazeki*.

John W. D. Megaw

TERZIN, A. L., in co-operation with J. GAON, & with the technical assistance of M. HADŽIĆ, H. HARLAČ & V. HLAČA. **Some Viral and Rickettsial Infections in Bosnia and Herzegovina. A Sero-Epidemiological Study.** *Bull. World Health Organization*. Geneva. 1956, v. 15, Nos. 1/2, 299-316, 2 figs.

Complement-fixation tests with antigens of *Rickettsia prowazeki*, *R. akari*, *R. burneti*, psittacosis virus and mumps virus were performed on 115 sera from healthy persons living in rural areas of Bosnia and Herzegovina. Positive results (titre 1 in 4 or higher) with 1 or more antigens were given by 103 sera (about 90%), the percentage of positives with individual antigens being as follows: typhus—47·8; rickettsialpox—20·0; Q fever—31·3; psittacosis—56·5; mumps—33·9. The percentage of typhus-positive sera increased significantly with age and Moslems developed positive titres earlier than non-Moslems. The living conditions and habits of Moslems (especially their closely grouped settlements, use of rugs and hides in sleeping quarters, and prolonged visits to sick

relatives) are thought to favour typhus infection. Epidemic typhus is commoner among Moslem children and adolescents than among adults; non-Moslems showed no significant difference in the incidence of epidemic and sporadic cases among the various age-groups.

In contrast, infection with *R. burneti* appears to occur earlier and at a higher rate in the non-Moslem than in the Moslem population, probably because non-Moslems are in closer contact with their livestock.

Rickettsialpox has not been diagnosed clinically or serologically in Yugoslavia, and the positive titres with *R. akari* may represent an immunological response to other rickettsioses.

The percentage of positives with psittacosis antigen was surprisingly high (only 1 human case of this infection has been diagnosed in Yugoslavia); a proportion of positive titres may be due to contact with lymphogranuloma venereum virus.

Results with mumps antigen showed the usual fall in the percentage of positive sera with increasing age, differences between Moslems and non-Moslems being insignificant.

R. S. F. Hennessey

BEKTEMIROV, T. A., TARASEVICH, I. V. & KARULIN, B. E. [**A Study of an Epidemic Focus of Q Fever in the Crimea**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*. Moscow. 1956, No. 11, 20-26. 1 diagram. [In Russian.]

Field studies were carried out in 1954-5 in a focus of epidemic Q fever in the Crimea, consisting of a town and 6 outlying inhabited points engaged in dairy farming. Complement-fixing antibody was found in 65 (48%) of 135 healthy persons living in rural areas and in 10 (9.1%) of 109 living in the town. Cases mainly occurred between March and August, and the seasonal incidence was probably related to the increased contact with cows during the period of calving, lactation and summer pasturing. People aged 20-50 years were mainly affected (128 of 169 persons with antibody; 75.7%).

Cases were sporadic and not connected with each other, but contact of the patient with cattle or their products could usually be demonstrated. In complement-fixation tests carried out in August and September antibody was found in 23.9% of 481 cattle and 5.7% of 87 horses. The causative organism was isolated from cow udders, liver and spleen, and 3 strains were isolated from raw milk. Of 338 persons questioned in detail 52% of 110 with antibody had had close contact with cattle, and antibody was present in only 13 of 134 who had had no such contact. Among the persons in the latter group antibody was present in 60.7% of those drinking raw milk [number not stated] and in 16.3% of those who did not drink it. Infection by inhalation was also possible, as the organism was isolated from the air of cattle sheds. Three strains were isolated from ticks (*Hyalomma plumbeum* and *Rhipicephalus bursa*)

collected from domestic and wild animals, and transovarian transmission of the infection was demonstrated in the laboratory in both species. In surveys of a number of species of rodents and birds caught in the area evidence of infection was found only in *Cricetulus migratorius*.

The authors conclude that a natural focus of infection has been present in the Crimea for a long time, and has been provoked into epidemic activity by the introduction of cattle from elsewhere and by population movements during and after the war.

D. J. Bauer

STERKHOVA, N. N. & MIRZOEVA, N. M. [**Q Fever in Azerbaijan**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*. Moscow. 1956, No. 12, 84-8. [In Russian.]

Serological tests for the diagnosis of Q fever were carried out in 1954 on animals sent to a slaughterhouse from various parts of Azerbaijan. Agglutinin for *R. burneti* was found in the sera of 473 of 972 cows (48.6%) in titres of 16-128, in 65 of 282 sheep (23%) in titres of 16-20, and also in 7 of 16 buffaloes. Complement-fixing antibody was present in 28 of 289 cows (9.7%) and 15 of 65 sheep (23.1%) in titres of 8-160.

Guineapigs inoculated intraperitoneally with milk from an immune cow developed specific antibody, and the infection could be transmitted through several passages; rickettsiae were similarly detected in ticks (*Hyalomma plumbeum plumbeum*) collected from cows.

Complement-fixing antibody was present in 33 of 561 persons (5.9%) working in the slaughterhouse, on dairy farms, or having other contact with animals, and in 88 of 1,077 persons (8.2%) who had suffered from an undiagnosed pyrexial illness in the previous 2 years.

D. J. Bauer

PCHELKINA, A. A., ZHMAEVA, Z. M. & ZUBKOVA, R. I. [**Q Fever in Northern Kazakhstan**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*. Moscow. 1956, No. 11, 32-5. [In Russian.]

In 1954 outbreaks of acute febrile illness were noted among a labour force engaged in reclaiming virgin and abandoned steppe land in north Kazakhstan. The patients complained of weakness, fever, severe headache and pains behind the eyes; the febrile period lasted for 4-11 days. Q fever complement-fixing antibody was found in 22 convalescent-phase sera in titres ranging from 20 to 320, and a positive agglutination reaction with 10 sera in titres of 8-256.

The causative organism was isolated by the intraperitoneal inoculation of guineapigs with blood taken from a patient on the second day of illness, and after adaptation to passage in the yolk sac it was shown to be identical with the Italo-Greek strain of *Rickettsia burneti* in cross-immunization tests in guineapigs. The organism was also isolated from a pool of larvae, nymphs and adult forms of the tick *Ixodes crenulatus* caught on a polecat from the same area.

D. J. Bauer

KULAGIN, S. M. & SILICH, V. A. [**Q Fever in the Grozny District**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*. Moscow. 1956, No. 11, 35-9, 2 charts. [In Russian.]

In the spring of 1955 an outbreak of Q fever occurred among collective farm workers in the Grozny district of the Caucasus. Whole families were often affected, including children and infants. Complement-fixing antibodies were present in the sera of 47 (32.6%) of 144 healthy persons living in the same area, and in 24 (33.3%) of 72 cows; milk was apparently the source of infection. In cows the disease produced abortion, retention of the placenta, metritis and sterility, and many calves died of rickettsial pneumonia.

Investigation of other inhabited points in the Grozny district showed that several unrecognized outbreaks of Q fever had recently occurred among agricultural workers; in one instance 6 men engaged in digging out an irrigation canal contaminated by cattle were affected, and laboratory studies showed that *Rickettsia burneti* could survive in water at 20-22°C. for up to 160 days.

D. J. Bauer

ZHMAEVA, Z. M., MISHCHENKO, N. K. & PHELKINA, A. A. [**Spontaneous Infection of *Hyalomma anatolicum* Koch with the Causative Organism of Q Fever in Southern Kirghiz**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*. Moscow. 1956, No. 11, 30-31. [In Russian.]

In an investigation of the epidemiology of rickettsial infections in southern Kirghiz ticks of the species *Hyalomma anatolicum* and *Rhipicephalus turanicus* were collected from horses and cows grazing on the steppes along the River Aravan. Larvae from *H. anatolicum* were allowed to feed on guineapigs, and these developed a febrile illness after 6 days which could be transmitted by serial intratesticular passage. Rickettsiae could be seen in stained smears of subcutaneous exudate and testicular tissue, and serum from animals of the 5th passage fixed complement with Q fever antigen in a titre of 16. Nymphs were also able to transmit the infection.

D. J. Bauer

FEDOROVA, N. I., BEKTEMIROV, T. A., TARASEVICH, I. V., KERBABAIEV, E. B. & SEMASHKO, L. L. [**The Prevalence of Q Fever in Cotton Workers**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*. Moscow. 1956, No. 11, 27-30. [In Russian.]

Several outbreaks of Q fever have occurred in European Russia during the last 3-4 years among workers handling cotton imported from Central Asia, and the authors have carried out an investigation in a cotton-growing area in Turkmenia in order to trace the source of infection.

Complement-fixing antibody was present in 62 (10.2%) of 605 persons working in factories which received raw cotton from all parts of the region,

and a similar incidence of immunity (13%) was found in a control group of 108 persons who had no contact with cotton. Attempts to isolate *Rickettsia burneti* from 6 samples of atmospheric dust from the cotton factories were unsuccessful. No evidence of infection could be obtained in the examination of pigeons and mice caught on the factory premises, but specific antibody was found in the sera of 13.7% of 81 cows and 9.2% of 76 sheep from the same neighbourhood.

The source of infection of the cotton could not be traced, but the authors suggest that heaps of cotton stacked by the roadside after picking might be contaminated by passing cattle.

D. J. Bauer

GERBEC, M. & MORELJ, M. Q-groznica: laboratoriske infekcije sojem "Piro" [Q Fever: Laboratory Infections with the Strain "Piro"] *Higijena*. Belgrade. 1956, v. 8, Nos. 2/3, 117-29, 3 diagrams. [19 refs.] English summary.

The authors describe 12 cases of Q fever which occurred in a laboratory in which the Piro strain of *Rickettsia burneti* was being handled. The outbreak occurred after the organism had been adapted to passage in the yolk sac, and was presumably due to contamination of the environment from material in which the organism multiplied to high titre. 11 of the 12 persons affected had harvested yolk sacs or had entered the rooms in which the material was being handled. 5 persons had previously received 1 or more doses of Q fever vaccine. The incubation period could be established as 15 days in one case. The diagnosis was confirmed by complement-fixation tests and by the isolation of *R. burneti* from the blood of 3 of 6 patients.

D. J. Bauer

BLANC, G. & BRUNEAU, J. Étude épidémiologique dans la forêt de Nefik. I.—Présence chez le lapin de garenne et ses arthropodes piqueurs de virus pathogènes pour l'homme. [An Epidemiological and Ecological Study of Nefik Forest. I.—Presence in the Wild Rabbit and its Biting Arthropods of Viruses Pathogenic for Man] *Arch. Inst. Pasteur du Maroc*. 1956, v. 5, No. 5, 87-200, 51 text figs. (2 folding) & 45 figs. on 13 pls.

The authors made a study of the Nefik Forest about 20 miles north-east of Casablanca, Morocco, which was created in 1921-22 and is now a popular holiday resort. Very large numbers of the tick *Hyalomma excavatum* were observed there during the summer, and also many wild rabbits which seemed to be the obvious host for the ticks. During 1954 and 1955, 339 rabbits were caught and examined for external parasites and also for the presence of any pathogenic viruses. Details are given of the ticks found on the rabbits, including *Rhipicephalus sanguineus*, the most common, *Hyalomma excavatum* and a few *Ixodes* [*ricinus* ?]. Ticks were also found wandering about the ground and on the vegetation

and readily attacked man, especially in the larval stages. Comparatively few cattle were present and the rabbits were obviously the hosts of the majority of the larval stages. In addition the flea, *Xenopsylla ramesis*, was found in the burrows, in addition to *Spilopsyllus cuniculi* and *Ctenocephalides canis*, and all stages of the tick *Ornithodoros erraticus*.

The rabbits were found to harbour the organism of Q fever, *Rickettsia burneti*; a strain of *Pasteurella*; a murine type of typhus; *Spirochaeta hispanica*; and *Trypanosoma nabiasi*. *Hyalomma* both free and on rabbits was frequently infected with Q fever; *Rhipicephalus* was only rarely infected and *Ixodes* never. In spite of the prevalence of numerous larvae of *Hyalomma* infected with Q fever, there seems to be little danger of their infecting human beings as the larvae rarely bite man and are always removed before they have had time to become engorged and produce infection. Spirochaetosis may be transmitted by the *Ornithodoros erraticus*, which are frequently infected with this parasite; on two occasions they were also found to harbour Q fever.

This forest presents an interesting example of the natural conservation in wild animals of viruses pathogenic for man, but in the absence of efficient methods of transmission to their potential human host remain practically innocuous.

[See also this *Bulletin*, 1957, v. 54, 155.]

Edward Hindle

CRADDOCK, A. L. **Q Fever—Human Aspects.** *East African Med. J.* 1956, Nov., v. 33, No. 11, 435-9.

The author has encountered Q fever among the European residents in a farming area in the Rift Valley in Kenya. The disease manifests itself as fever of sudden onset accompanied by rigors and profuse sweating, severe frontal headache, anorexia, constipation, a flushed skin and about the 4th day a cough associated with pain in the chest and sometimes bloodstained sputum. A chest X-ray sometimes shows signs of segmental pneumonia. The diagnoses were confirmed by complement-fixation tests, a titre of 1 in 100 indicating that the patient had suffered from Q fever, probably recently. The fever yielded to chlortetracycline (aureomycin) within 24 to 48 hours but less quickly and certainly to chloramphenicol.

The dry atmosphere of the Rift Valley favours the dissemination of dust, one possible method of spread of Q fever.

[For previous reports of Q Fever in Kenya, see this *Bulletin*, 1952, v. 49, (853); (*East African Med. J.*, 1952, v. 29, 128); 1956, v. 53, 1111].

Frederick J. Wright

SYRŮČEK, L. & RAŠKA, K. **Q Fever in Domestic and Wild Birds.** *Bull. World Health Organization.* Geneva. 1956, v. 15, Nos. 1/2, 329-37. [12 refs.]

This is a report on investigations in 1954 and 1955 concerning the incidence of *Rickettsia burneti* infection among domestic and wild birds

in areas of Czechoslovakia where Q fever had occurred. Sera from domestic birds gave positive complement-fixation (CF) tests with *R. burneti* antigen (Henzerling strain) at a titre of 1 in 16 or over as follows: hen—49 positives out of 355 examined (15.9%); duck—2 out of 111; turkey—2 out of 42; goose—3 out of 33; pigeon—9 out of 31. A control group of 28 hens from an area where Q fever had not been found gave negative results. In an experiment to elucidate the possible role of the domestic fowl, only 3 out of 8 hens inoculated intraperitoneally with *R. burneti* showed a specific increase in complement-fixing antibodies, and this not until 6 weeks after infection. It has been shown, however, that an experimentally infected hen may excrete *R. burneti* in the stools from the 7th to the 40th day after infection. The results of CF tests on sera from wild birds were as follows: birds inhabiting infected farms—27 positives out of 187 examined (15.8%); birds from the immediate neighbourhood of infected farms—7 out of 176 (4.3%); birds living away from human habitations—2 out of 117 (1.8%). Individual species gave the following results: swallow (*Hirundo rustica*)—8 positives out of 92 examined; house martin (*Delichon urbica*)—14 out of 60; house sparrow (*Passer domesticus*)—5 out of 35; black redstart (*Phoenicurus ochruros*)—2 out of 23; wren (*Troglodytes troglodytes*)—1 out of 2; great tit (*Parus major*)—1 out of 8; chaffinch (*Fringilla coelebs*)—1 out of 51; yellow-hammer (*Emberiza citrinella*)—1 out of 31; white wagtail (*Motacilla alba*)—1 out of 17; great spotted woodpecker (*Dryobates major*)—1 out of 9; greenfinch (*Chloris chloris*)—1 out of 9. In 35 attempts to recover *R. burneti* from organs (spleen and liver) of birds, 1 isolation was made from a redstart (*Phoenicurus phoenicurus*), 1 from a white wagtail (*Motacilla alba*) and 2 from pooled organs of swallows. A strain of *R. burneti* was also obtained from ectoparasites (*Ornithomyia biloba*) of swallows.

These results appear to demonstrate the involvement of domestic and wild birds in the cycle of *R. burneti* in an endemic focus which is believed to have been set up by the importation of infected sheep during or after the second world war. Hens and other poultry represent a possible source of infection for man. The isolation of the organism from migratory birds is specially interesting; these birds annually visit areas where Q fever has long been prevalent and thus may be concerned in transmitting the infection over long distances. [This paper is a valuable epidemiological contribution.]

[For previous studies by Syrůček *et al.*, see this *Bulletin*, 1955, v. 52, 758; 1956, v. 53, 173, *bis*; 1957, v. 54, 24.] R. S. F. Hennessey

SOMOVA, A. G. & GERASYUK, L. G. [Specific Prophylaxis of Q Fever] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*. Moscow. 1956, No. 11, 12–17. [In Russian.]

An outbreak of Q fever occurred in January 1955 among the workers in a meat processing factory in Rostov, U.S.S.R. In an investigation

carried out 5 months later complement-fixing antibody was present in 63 of 430 workers (15.25%) in titres of 10-160. Mass vaccination with a killed vaccine of *Rickettsia burneti* was then carried out. No serious reactions were observed in a preliminary trial on 20 persons with no immunity, and 435 persons were then given 3 injections of the vaccine; general reactions occurred in 96 and local reactions in 172. A similar incidence of reactions was seen in a further group of 342 persons whose immune state had not previously been investigated. Complement-fixing antibody was present in titres of 10-640 (mean 75) in 144 of 359 vaccinated persons (40.11%) examined 40-60 days after the final inoculation; there was no correlation between development of antibody and presence or absence of reaction to vaccination.

D. J. Bauer

ZUBKOVA, R. I., FEDOROVA, N. I. & KALMYKOV, N. L. [**Mass Vaccination against Q Fever. II. Late Results of Vaccination**] *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*. Moscow. 1956, No. 11, 18-20. [In Russian.]

The immune status of persons treated with 3 doses of Q fever vaccine [see above] has been reinvestigated after intervals of 5 and 10 months. Complement-fixing antibody was present in titres up to 640 (mean 70) in 215 (73%) of 294 persons examined after 5 months, and in titres up to 320 (mean 30) in 158 (47.4%) of 333 examined after 10 months. A fall in titre was observed in 52 of 73 persons examined at both times. Antibody had appeared in only 1 of 157 unvaccinated persons of a control group who had previously been found negative at the time when the vaccinations were carried out, and the persistence of antibody for up to 10 months after vaccination could not therefore have been due to the occurrence of subclinical infections.

During the period under review 14 cases of Q fever occurred in unvaccinated persons who had received the vaccine. Hard infiltrations up to the size of a pigeon's egg were present at the site of inoculation in 10% of persons examined after 10 months, and ulceration had occurred in 10 persons. In view of the severity of the local reaction the authors suggest that vaccination should be confined to persons who are particularly exposed to infection.

D. J. Bauer

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

- I. MACDONALD, W. W. *Aedes aegypti* in Malaya. I.—**Distribution and Dispersal.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 385–98, 1 map. [25 refs.]
- II. —————. II.—**Larval and Adult Biology.** *Ibid.*, 399–414, 1 graph. [Numerous refs.]

These investigations were undertaken in recognition of the risk of yellow fever being introduced into Malaya and, on that account, the need to consider means of controlling *Aedes aegypti* in the territory.

I. In the first paper, the text, supported by a map of Malaya and tables, reveals how *Aedes aegypti* has, since the beginning of the present century, spread inland from coastal towns, there being little difference now between indices for adult *Aedes aegypti* in coastal and many inland towns (38% and 34%, respectively). Coastal villages have also a similar index (32%) but inland villages are less invaded with a mean index of only 18%. Dispersal is by transport of adults or aquatic stages, particularly the eggs. Some of rural Malaya is not yet invaded by *Aedes aegypti* and success in becoming established seems more difficult than might be expected. 5 young, blood-fed fertilized females and, later, 100 eggs were introduced to a village free of the species and apparently well-suited for it. There was no evidence of its being established within 2 or 3 months. Once established, the species depends considerably on the density of housing for its dispersal within an area and, of course, standards of domestic hygiene in the dwellings. It may require 3 or 4 years for an initial invasion to reach average densities (adult index about 40%). Eradication of *Aedes aegypti* becomes a progressively more difficult proposition as the species continues to spread into rural Malaya.

II. In Africa it is known that *Aedes aegypti* may be found in forest far from human habitations, breeding in tree holes and being non-anthropophilic in habit. In Malaya it has sometimes been found breeding in tree-holes and suitable water-holding plant axils but the species is predominantly domestic in its breeding sites, the conditions resembling those in India and the Pacific. Up to just over 50% of breeding places may be out-of-doors but within 10 yards of the nearest house. The common sites are collections of water in ant-traps, jars, drums and a variety of articles like disused tyres, and pots, tanks, etc. Latex cups are not used, but this may be because these are too far from dwellings. *Aedes albopictus* commonly breeds in latex cups. It also occurs together with *Aedes aegypti* larvae in and outside dwellings. There is evidence from survey in the field and from laboratory tests that *Aedes aegypti* is better adapted than *Aedes albopictus* to breeding in small containers and

that the presence of the latter is very unlikely to prevent normal development of *Aedes aegypti*. Dependence of *Aedes aegypti* in Malaya on human blood may be responsible for its restriction to the proximity of dwellings.

Although *Aedes aegypti* is usually considered to bite only by day, some biting by night is known in the Kenya coast [this *Bulletin*, 1956, v. 53, 575], some Pacific islands and, possibly, elsewhere. In Malaya, biting appears to be principally by day, especially during the mid-morning and late afternoon. About 10% of biting is out-of-doors. The mosquitoes will come to feed even if well-fed and semi-gravid.

Laboratory investigations showed that most *Aedes aegypti* of Malaya take a blood meal within 2 days of emergence. Oviposition occurred in the first cycle usually between the second and fourth days after feeding, sometimes later; in later cycles most (81%) of the females laid within the third day. A variable proportion of females (6 to 79% of different batches) failed to become gravid with the first blood meal and experiments indicate that failure in this respect was a result of insufficient food in the larval stage. This was also directly related to the egg-yield per female. The author goes on to discuss different aspects of larval and adult food on the vigour of a mosquito colony.

In Malaya, resting indoors is characteristic of *Aedes aegypti*, nearly 60% of them resting on clothing and covers not usually sprayed in control work and which were washed at intervals. Only 10% rested on walls and ceilings, the remainder on furniture. Between 81 and 96% were fertilized and about 60% either semi- or fully-gravid. Pre-gravids, that is, those failing to develop eggs beyond stage II on one (or more) blood meals, also occurred and it is suggested in the light of the laboratory tests above that the proportions of pre-gravids would depend on adequacy of larval food in the breeding places.

D. S. Bertram

PANTHIER, R. Recherche d'une méthode précise de titrage des anticorps par test de séroprotection. [**Search for a Precise Method of Measuring Antibodies in the Mouse-Protection Test**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 759-68.

Discussing the precision with which neutralizing antibodies for yellow fever virus can be measured by means of the mouse protection test, the author examines the applications of a "virulence curve" constructed for lyophilized stock virus by plotting reciprocals of mean survival time ($1/T$) of groups of mice inoculated with diluted virus against the respective log. concentrations of virus inoculated [although $1/T$ is defined as above, the context suggests that it denotes the harmonic mean of survival time]. Having obtained the LD50 of the virus preparation in the usual way, the $1/T$ value for a group of mice inoculated with a serum-virus mixture can be applied to the curve in order to find the number of LD50 neutralized by the serum.

The method requires virus preparations which give consistent virulence curves. Those obtained with a preparation of the Dakar strain of yellow fever virus showed a variability which indicated that the preparation was unsuitable for use in the protection test; in contrast, preparations of the 17D strain gave regular curves which enabled sera to be tested with satisfactory precision.

Variability in behaviour of virus preparations is attributed to "dispersion of virulence", a concept which is explained in terms of the proportions of virus particles of differing orders of virulence and stability which are present. [No experimental data are given.]

R. S. F. Hennessey

DENGUE AND ALLIED FEVERS

ROBINSON, Marion C. **An Epidemic of a Dengue-Like Fever in the Southern Province of Tanganyika.** *Central African J. of Med.* 1956, Nov., v. 2, No. 11, 394-6, 1 fig.

The author again describes the epidemic of a dengue-like fever which she, and also LUMSDEN, reported in 1955 [*this Bulletin*, 1955, v. 52, 442].

The symptoms started so abruptly that the patients were immobilized within a period of a few minutes to 2 to 3 hours. The disease was not familiar to the local people, who coined a new word likening the sudden incapacitation of the patient to the folding up of the leaves of those "sensitive plants" which do so when touched.

Troublesome recurrent joint pains interfered with hoeing sufficiently to threaten the next harvest.

The other features of the outbreak, all typical of dengue, are repeated [*loc. cit.*].

Frederick J. Wright

RABIES

DOMÍNGUEZ, A., POTENZA, L. & PIEK, W. Sobre un caso de rabia humana en un niño. [**A Case of Rabies in a Child**] *Archivos Venezolanos Puericult. y Pediat.* 1956, July-Sept., v. 19, No. 61, 243-8, 4 figs. on 2 pls.

A case in a child of 7 in Caracas.

WILCOX, F. P. & HUBBARD, R. C. **Rabies Epizootic in Dairy Cattle.**
J. Amer. Vet. Med. Ass. 1957, Jan. 15, v. 130, No. 2, 63-6.

" 1) An epizootic of rabies is described in which 24 cattle and 1 sow died over a six month period, including three 'latent' cases.

" 2) The extreme variability in the symptomatology of rabies in cattle is illustrated.

" 3) Epidemiological studies implicate a dog as the probable source of infection.

" 4) Rabies virus was demonstrated in brain and salivary tissue, but not in milk or the brain of a stillborn calf."

QUIST, K. D., EADS, R. B. & CONKLIN, Alice. **Studies on Bat Rabies in Texas.** *J. Amer. Vet. Med. Ass.* 1957, Jan. 15, v. 130, No. 2, 66-8.

See this *Bulletin*, 1956, v. 53, 580.

TJALMA, R. A. & WENTWORTH, Bertina B. **Bat Rabies—Report of an Isolation of Rabies Virus from Native Ohio Bats.**—*J. Amer. Vet. Med. Ass.* 1957, Jan. 15, v. 130, No. 2, 68-70.

SARTORIUS, F. Neuere Ergebnisse und Probleme der Tollwutbekämpfung. [**Present Problems of Rabies Control**] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete.* Berlin. 1956, July-Aug., v. 2, No. 4, 253-85, 16 figs.

This long and informative paper gives a good account of the prevalence of rabies in the countries of Europe, Asia, Africa and America. Australia, New Zealand and Oceania are free of the disease. In spite of many efforts to eradicate the disease success has been achieved only in a few countries such as England, Switzerland, the Netherlands, Sweden, Norway and Denmark where there are good standards of living, rigid veterinary control and freedom from the danger of the introduction of the virus by infected animals from adjoining countries. The spread of rabies through Germany, particularly in the Democratic Republic, as a result of the circumstances of war after 1945 is traced with the help of a number of maps [see also this *Bulletin*, 1954, v. 51, 568] with mention of an increased incidence after the first world war and also after the Polish campaign of 1939. A table sets out the number of cases of rabies in wild and domestic animals which have been notified since 1947, *e.g.*, in 1951 a total of 686 animals including 518 dogs and 37 foxes and in 1953, 104 dogs and 375 foxes among a total of 619 animals.

Most of the paper is devoted to a long description and discussion of the pathogenesis of the disease, the mode of spread of the virus in the infected body and of recent published and unpublished work on active and passive immunization.

Finally, the problems of organization of plans for the control of rabies, regarded as a pandemic disease, are discussed. Research and evaluation of protective methods in different countries should be under international agreement and action. Legal enactments to direct veterinary and police actions in respect of such matters as quarantine, inspection and destruction of possibly infected animals should be similar in the different countries. The third point is the difficult problem of dealing with the endemic infection among wild animals. Last but not least to be considered is the importance of propaganda and education of the people in the nature and sources of the disease so that they may collaborate willingly with the authorities in the work of prevention.

M. E. Delafield

ROLLINSON, D. H. L. **Problems of Rabies Control in Africa.** *East African Med. J.* 1956, Nov., v. 33, No. 11, 425-33. [25 refs.]

Rabies seems to be a relatively recent disease in Africa but it is now definitely established in wild animals and game reserves may act as reservoirs of infection. This all adds to the difficulties of control, all of which are discussed.

Figures are given for records of rabies in man and in animals in East Africa and elsewhere.

J. Carmichael

ACHA JAMET, P. & ZAPATEL VÁSQUEZ, J. Campañas antirrábicas en ciudades de tipo rural en el Perú. [**Campaign against Rabies in Rural Areas in Peru**] *Bol. Oficina Sanitaria Panamericana.* 1956, Nov., v. 41, No. 5, 420-26, 4 figs. & 2 graphs. [13 refs.]

NETTER, R. Essais médicamenteux dans le traitement préventif de la rage à virus fixe chez la souris. [**Evaluation of Certain Medicaments in the Preventive Treatment of Fixed-Virus Rabies in the Mouse**] *Ann. Inst. Pasteur.* 1957, Jan., v. 92, No. 1, 142-5.

The object of the author's experimentation was two-fold: to determine *in vitro* and *in vivo* the action of 33 different drugs on the Saigon strain of fixed rabies virus at its 3,090th-3,107th passage and to ascertain to what extent they might serve as adjuvants to anti-rabies vaccination. The substances investigated included vitamins, drugs for the treatment of infections, parasitic and inflammatory conditions (*e.g.*, emetine, chloroquine, phenylbutazone), sodium mercuriothiolate, preparations acting on the nervous system (*e.g.*, adrenaline, strychnine, atropine), arsenicals (*e.g.*, stovarsol, tryparsamide, Diphetarsone) and phenothiazine derivatives (*e.g.*, chlorpromazine, diethazine, isothazine). The techniques used for the several determinations may be summarized as follows. For viricidal power *in vitro* a mixture of 5% virus-infected

brain material and the drug under test was placed in the incubator at 37°C. for periods of 24 hours to 5 days and then inoculated intracerebrally into groups of mice. For action *in vivo* groups of mice were inoculated intracerebrally with 10^{-4} to 10^{-7} dilutions of fixed virus and then, on the day after the inoculation and every day thereafter, they received *per os* or intramuscularly the drug under test; the LD₅₀ for untreated mice serving as controls for each group was approximately $10^{-7.2}$. For adjuvant action Habel tests were carried out on vaccinated mice, to which the drug had been administered during immunization or after intracerebral challenge.

Results showed only the arsenical Diphetarstone and the phenothiazine derivatives diethazine and isothazine to be of practical value. As regards Diphetarstone: its viricidal power *in vitro* was less than that of phenol; its action *in vivo*, when administered intramuscularly in a daily dosage of 50 mgm./kgm., was to bring the LD₅₀ from more than 10^{-7} to 10^{-5} , an almost similar effect being observed when injections were delayed till the 3rd day after intracerebral inoculation of the virus dilutions; as an adjuvant to vaccination it proved its value, both when given to mice intramuscularly during or after their immunization by Habel's method with a 1 in 20 dilution of phenolized vaccine and when administered to these animals in a vaccine prepared from 5% brain substance with 1% Diphetarstone and incubated at 37°C. for 24 hours. Habel potency tests showed the latter vaccine to possess an antigenic value equal to that of the phenolized (0.5%) vaccine produced at Saigon. As regards diethazine, its viricidal power *in vitro* was 4 times greater than that of phenol, while *in vivo* its intramuscular administration in a daily dosage of 50 mgm./kgm. lowered the virulence of the fixed virus for mice by one decimal dilution; as an adjuvant to vaccination its intramuscular administration to mice brought the LD₅₀ of Habel's test from 10^{-4} to 10^{-3} . Isothazine was somewhat less viricidal *in vitro* than diethazine, but its action *in vivo* was similar, while its role as an adjuvant to vaccination was not inconsiderable.

G. Stuart

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

JACKSON, S. & BURROWS, T. W. **The Pigmentation of *Pasteurella pestis* on a Defined Medium containing Haemin.** *Brit. J. Exper. Path.* 1956, Dec., v. 37, No. 6, 570-76, 2 figs. on pl.

Dark brown colonies were formed by many strains of *Pasteurella pestis* on a medium containing haemin in excess of growth requirements. On

prolonged incubation, the pigmented colonies gave rise to non-pigmented secondary colonies of organisms which were relatively avirulent for mice. A chemically-defined medium suitable for differentiating pigment-producing (P) and non-pigment-producing (NP) strains contained galactose, amino-acids and 100 μ gm. haemin per ml.

Of 20 strains examined, 2 gave homogeneous P and 2 homogeneous NP colonies, the remaining 16 giving mixtures of P and NP colonies. Mutation from P to NP, but not from NP to P, occurred in all these strains. P strains absorbed haemin more readily from liquid media than did NP strains. It appears likely that *P. pestis* is P type in nature and that mutation to NP type followed by preferential selection may contribute to loss of virulence in laboratory cultures. *R. S. F. Hennessey*

JACKSON, S. & BURROWS, T. W. **The Virulence-Enhancing Effect of Iron on Non-Pigmented Mutants of Virulent Strains of *Pasteurella pestis*.** *Brit. J. Exper. Path.* 1956, Dec., v. 37, No. 6, 577-83.

A non-pigmented strain (M7) derived from a fully virulent pigmented strain (M3) of *Pasteurella pestis* [see above] showed marked reduction of virulence for mice, inocula over the range of 10^1 - 10^7 organisms not being consistently lethal. There was no proportionality between numbers of deaths and of injected organisms, while relatively few organisms were isolated from dead mice.

Injection of haemin (4 mgm.) or ferrous sulphate (0.1 mgm.) together with 6.5×10^4 M7 organisms produced virulent infections comparable with those caused by the parent M3 strain. Avirulent mutants of other virulent pigmented strains were also restored to full lethality by injection of ferrous sulphate together with the bacterial inoculum, but non-pigmented mutants of avirulent, pigmented strains were not rendered virulent by this means. It is suggested that M3 is able to derive iron from some component in the mouse which cannot be metabolized by M7. *R. S. F. Hennessey*

RANSOM, J. P. **Some Aspects of Relationship between Antigens of *Pasteurella pestis* and *Pasteurella pseudotuberculosis*.** *Proc. Soc. Exper. Biol. & Med.* 1956, Dec., v. 93, No. 3, 551-4, 2 figs. [17 refs.]

Lysed and unlysed suspensions of *Pasteurella pestis* and *P. pseudotuberculosis* were examined for antigenic differences by the gel-precipitin method with anti-plague serum globulin as internal reactant [this *Bulletin*, 1955, v. 52, 627; 1956, v. 53, 313]; lysis was produced by high-speed vibration in the presence of glass beads. Results showed that 2 extracellular antigens (probably "envelope" antigens) were shared by both organisms, a third extracellular antigen being produced by *P. pestis*

alone. *P. pestis* contained 2 intracellular antigens which were not shared with *P. pseudotuberculosis*. *P. pseudotuberculosis* possessed a greater concentration of the slowly-diffusing meniscus antigen present in *P. pestis*. At least 1 intracellular antigen present in both organisms was so firmly bound to the soma that it did not react with serum unless cell walls were largely destroyed; this antigen is perhaps identical with the somatic antigen of SCHÜTZE [*ibid.*, 1932, v. 29, 676]. One of the unshared antigens probably represents the toxin of *P. pestis*. *P. pseudotuberculosis* did not show any specific antigen when examined by this technique.

R. S. F. Hennessey

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

LAHIRI, S. C. & GUHA, A. C. **Antibacterial Effects of some Synthetic Compounds on *V. cholerae* and other Organisms.** *J. Indian Med. Ass.* 1956, Sept. 1, v. 27, No. 5, 161-7.

In earlier studies a crude extract of various barks, thiodiamine, was found to be effective against *V. cholerae* both *in vitro* and when administered orally to patients. 10 new compounds of phenyl and diphenyl linkages were, therefore, investigated. 4 of these, orthothiocarbamidophenol, 4'-4'-dihydroxythiocarbamidophenol, ortho-aminophenol and para-aminophenol, were found to inhibit the growth of *V. cholerae* in fluid and solid media in dilutions of 1 in 32,000 to 1 in 60,000. They also showed activity against haemolytic streptococci, *Staph. aureus*, *Shigella shigae* and *Salm. typhi*, but in higher concentrations. No action was noted against *Esch. coli*. These compounds were shown to have a low toxicity for rabbits when administered orally and were, therefore, selected for clinical trial in cholera.

In the clinical trial 34 patients were treated with orthothiocarbamidophenol, 8 with 4'-4'-dihydroxythiocarbamidophenol, 14 with para-aminophenol, 10 with ortho-aminophenol, 8 with sulphaguanidine and 8 with oxytetracycline. All compounds were given every 4 hours and the doses were 2-4 gm. for the new compounds, 500 mgm. with oxytetracycline and 4 gm. with sulphaguanidine. The results are difficult to assess owing to the fact that the infections in the different treatment groups were of unequal severity, but comparison of death rates did not appear to favour the new compounds. Bacteriological examination of stools indicated that para- and ortho-aminophenol had an antibacterial effect similar to that of sulphaguanidine or oxytetracycline, while the other two new compounds were less effective.

Mary Barber

BASU, S. N. **Polyvinyl Pyrrolidone (Plasmosan) in the Treatment of Severe Shock in Cholera.** *Calcutta Med. J.* 1956, Nov., v. 53, No. 11, 384-9, 4 graphs.

The author reports on the use of a 3.5% solution of polyvidone with electrolytes comparable with those in plasma (Plasmosan) in the treatment of severe cholera in which the patient has failed to respond satisfactorily to intravenous saline therapy. Those selected for this treatment showed a specific gravity of the blood between 1,056 and 1,060, absent or flickering radial pulses and blood pressures below 74/56 mm. Hg and usually not registering on the sphygmomanometer. 48 patients were treated of whom 20 died. The author divides the responses into 4 main groups:—

- (1) Immediate and sustained improvement in circulation after 540 ml. of Plasmosan—18 patients.
- (2) Immediate circulatory improvement but not sustained. Two infusions of 540 ml. of Plasmosan were given—3 patients, all of whom died of anuria 8 to 14 hours after the cessation of treatment.
- (3) (a) Delayed circulatory improvement but the improvement was maintained—17 patients with 5 deaths (4 from uraemia, one from a septic abortion);
(b) Delayed circulatory improvement but the improvement was not maintained—4 patients (all died with circulatory failure and anuria 6-38 hours after Plasmosan).
- (4) No response occurred in 6 patients after 1,080 ml. of Plasmosan.

The author attributes the high mortality rate to the grave condition of the patients before treatment and estimates that without Plasmosan most of them would have died. He suggests that earlier infusion of Plasmosan, immediately following continuous saline transfusion, might give better results.

[In the absence of a control group the results are difficult to assess except by clinical impression.]

Frederick J. Wright

CHATTERJEE, H. N. **Therapeutic Control of the Chief Alimentary Symptoms of Cholera. A Preliminary Study.** Reprinted from *Antiseptic*. 1955, Sept., v. 52, No. 9, 649-61, 2 figs. [76 refs.]

In this paper, the author has given, in more detail than he supplied in his two letters to the *Lancet* in 1953 [see this *Bulletin*, 1954, v. 51, 381], the results obtained in the treatment of cholera in the 1953 epidemic in Calcutta.

In the first half of 1953, February 1st to July 1st, there were 1,093 admissions for cholera. The routine treatment for all cases in which there was severe shock was "intravenous or parenteral" saline, but, if the specific gravity of the blood was below 1,062, it was often possible to counteract dehydration by oral administration of fluid, and in cases with blood specific gravity between 1,062 and 1,064, by oral and rectal

administration of fluid. Thus, in 186 cases (17% of the total) it was possible to avoid parenteral saline injections. This was facilitated by preliminary oral administration of Avomine, which reduced the vomiting [*loc. cit.*], and of the juice of *Coleus aromaticus*, which reduced the diarrhoea. For oral or rectal administration the author used a saline preparation containing 4 gm. of sodium chloride, 25 grammes of glucose and 10 ml. of rose water made up to 1 litre of water, and after the free flow of urine had started he added 2 gm. of potassium chloride to this mixture.

Avomine was used in 100 cases at the "peak of the epidemic" (with the good results previously reported), and the juice of *Coleus aromaticus* in 200 out of 240 consecutively admitted patients, the remaining 40 being made up by the selection of every sixth patient as controls. The mortality was 8.5% among the patients receiving the plant juice compared with 20% among the controls.

L. E. Napier

HUSAIN, M. M. S. **Enhancement of Immunity after Cholera Inoculation.**
J. Pakistan Med. Ass. 1956, Mar., v. 6, No. 1, 16-18.

"1. Dose used for human beings is 1 cc of a vaccine containing 80,000 million organisms per cc. Even ten times this dose failed to produce any untoward effects in rabbits weighing 1000 grams.

"2. Agglutination titre of sera after injection of higher dosage is considerably higher than that produced by smaller doses.

"3. Incorporation of calcium stearate to the vaccine materially enhances the agglutination titre of the sera of animals so injected.

"4. In spite of calcium stearate the antigens seem to get into circulation rapidly. Their gradual absorption over a long period in such a medium does not seem to be substantiated."

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

DECOURSEY, J. D., OTTO, J. S. & HOLDERMAN, B. S. **The Water Buffalo as an Agent in the Transmission of Protozoan Parasites in Rural Egypt, with special reference to Amoebic Dysentery.** *J. Egyptian Pub. Health Ass.* 1956, v. 31, Nos. 4-5, 143-9, 1 fig.

The authors, from Cairo, refer briefly to the intestinal protozoa which may be found in animals and then discuss the examination of the faeces of water buffaloes taken in the villages of Sindbis and Mit Halfa and in rural farm areas.

These animals are housed in the villagers' homes and bathe and drink in contaminated canals. Village women make a fuel from caked faeces of the buffalo mixed with straw, so that opportunity for transmission of infection between man and the buffaloes is considerable in areas where the incidence of *E. histolytica* is usually high.

Samples of faecal smears from 63 water buffaloes showed the presence of protozoa resembling *E. histolytica* (large race) in 30, small race in 54, *Endolimax nana* in 16 and *Enteromonas* in 57. 17 specimens were stained with iron haematoxylin and the small race was found in "88 per cent" and the large race in "23.5 per cent". Attempts to cultivate 25 positive specimens in triplicate on 2 conventional media were unsuccessful although human strains of *E. histolytica* grew well on these media.

Daily injections of emetine were given to a buffalo aged one year which showed cysts resembling those of *E. histolytica* in the faeces. The faeces were negative for both races on the 11th day, but on the 23rd day the small race reappeared and on the 35th day, both races were present.

The need for further studies is stressed.

H. J. O'D. Burke-Gaffney

MCQUAY, R. M., Jr. **Charcoal Medium for Growth and Maintenance of Large and Small Races of *Entamoeba histolytica*.** *Amer. J. Clin. Path.* 1956, Oct., v. 26, No. 10, 1137-41. [13 refs.]

The author describes two media for the cultivation of both the large and small races of *Entamoeba histolytica*. These media represent modifications of the charcoal medium used by HIRSCH [*Bull. Hyg.*, 1955, v. 30, 357] for the cultivation of the tubercle bacillus. The first modification is diphasic, the composition of the slant being as follows: $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ 3 gm.; KH_2PO_4 4 gm.; $\text{Na}_3\text{C}_6\text{H}_5\text{O}_7 \cdot 2\text{H}_2\text{O}$ 1 gm.; $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ 0.1 gm.; $(\text{NH}_4)_3\text{Fe}(\text{C}_6\text{H}_5\text{O}_7)_2$ 0.1 gm.; bacto-asparagine 2.0 gm.; bacto-tryptone 5 gm.; glycerin 10 ml.; distilled water 1 litre. After dissolving these ingredients by heat, the following are added: bacto-agar 10 gm., Norite A [activated charcoal] 1 gm., 1% acetone solution of cholesterol 25 ml. This charcoal agar is melted and dispensed in test-tubes for slanting, after which the overlay, consisting of 3 ml. sterile 0.5% saline (pH 7.4), is added. The 2nd modification, which is a fluid medium, has the same composition, but agar is omitted and only 10 ml. distilled water are used. To a litre of the basic preparation is added 1 litre of buffered saline, and the medium is poured in 6 ml. amounts into test-tubes. In the case of both media, rice powder is added before inoculation.

These media proved to be suitable for the cultivation of both races of *E. histolytica*, but while all strains of the large one grew equally well on the diphasic and fluid modifications, the small race grew best in the diphasic medium, in which 13 strains were isolated from 16 stools in which these amoebae were present. The new media are less suitable

for the cultivation of *E. coli*, *Endolimax*, *Iodamoeba*, *Dientamoeba* and *Trichomonas hominis*, which could not be maintained beyond the first subcultures.

C. A. Hoare

MOLINARI, V. Sur le comportement d'*Entamoeba dysenteriae* et d'*E. invadens* en présence de températures de -79°C (neige carbonique) et de -180°C (azote liquide). [Effect of Freezing on *Entamoeba histolytica* and *E. invadens*] *Bull. Soc. Path. Exot.* 1956, May-June, v. 49, No. 3, 532-40. [22 refs.]

The author describes further experiments on the effect of low temperatures on the trophozoites of *Entamoeba histolytica* and *E. invadens* [see this *Bulletin*, 1957, v. 54, 429]. In the new tests (in which trypanosomes and malaria parasites were also included for comparison) the technique was modified as follows: (1) samples of *Entamoeba* culture were dropped directly into a Pyrex tube containing liquid nitrogen (-180°C), in which they formed frozen globules which fell to the bottom of the container, from which they could be picked up with forceps for examination and cultivation; (2) slides covered with perforated paper were immersed for 30 minutes into liquid nitrogen, after which they were removed and a drop of culture was placed on them and examined; (3) ampoules containing the culture were inserted into a hole made in carbon dioxide snow (-79°C).

In a series of tests (with or without glycerol), in which the times of exposure to freezing and the temperature of thawing varied, it was found that the trophozoites of the two species of *Entamoeba* did not survive exposure to freezing at -79°C . and -180°C ., whereas trypanosomes (*T. evansi*, *T. equinum*, *T. equiperdum*, *T. congolense* and *T. brucei*) and *Plasmodium berghei* remained viable.

C. A. Hoare

LAMY, L. Mise au point concernant la recherche et l'identification des amibes dysentériques dans les produits pathologiques. [Critical Observations on the Study and Identification of Amoebae in Pathological Material] *Bull. Soc. Path. Exot.* 1956, May-June, v. 49, No. 3, 525-32.

DANARAJ, W. Amoebic Vaginitis. *Proc. Alumni Ass., Malaya.* 1956, Dec., v. 9, No. 4, 229-31. [20 refs.]

HAHNDEL, H. F. & PREGER, L. Agranulocytosis during Treatment with an Amoebicide. [Memoranda.] *Brit. Med. J.* 1957, Feb. 16, 387.

An Englishwoman of 27 in Calcutta was treated for proved *E. histolytica* infection with one tablet (250 mgm.) of camoform four times daily. On the fifth day thereafter she developed pyrexia, mild photophobia and pains in the limbs and neck: these manifestations abated

next day and no pharyngeal involvement was noted. The leucocytes which had been 5,200 per cmm. and the neutrophils which had been 70%, were now 2,300 and 71% respectively. Camoform was stopped after 4 gm. had been taken. The total and neutrophil leucocytes then became successively, on the sixth day 2,000 and 56%, and on the seventh 1,200 and 56%. On the sixth day treatment was begun with penicillin, pentnucleotide and cortisone acetate. On the third day of treatment the figures were 1,800 and 68% and 5 days later 5,100 and 57%. Improvement thereafter was consistent and the patient was still well 4 months later.

The authors have been unable to find any previous records of such a haematological change after camoform treatment.

H. J. O'D. Burke-Gaffney

ROGOVA, L. I. [**Pathogenicity of Strains of Dysentery Amoeba recovered from Healthy Carriers**] *Med. Parasit. & Parasitic Dis.* Moscow. 1956, v. 25, No. 4, 330-35, 1 fig. [18 refs.] [In Russian.]

In order to determine the virulence of various strains [presumably from Middle Asia] of *Entamoeba histolytica*, the author inoculated guineapigs and rabbits intracaecally with cultures of the amoeba, which had been recovered from 14 healthy carriers, 4 cases of amoebic dysentery and 2 convalescent carriers. The results were assessed by examination of the caecal contents of the animals for the presence of amoebae, and of the walls for lesions and histopathological changes, the severity of which was determined by a scoring system of 4 marks.

While the infection rate with the carrier and clinical strains was of the same order (about 50% of animals infected), there were marked differences in the severity of the ulceration of the caecal wall produced by the two groups of strains. Thus, in the majority (79%) of animals infected with carrier strains there were superficial lesions in the form of minute erosions, whereas deep ulcers developed in only 21%. On the other hand, the strains from clinical and convalescent cases produced minute erosions only in 33.3% of the animals, whereas in the majority (66.7%) there was severe ulceration.

C. A. Hoare

KRUPP, Iris M. **Amebic Invasion of the Liver of Guinea Pigs infected with the Larvae of a Nematode, *Toxocara canis*.** *Exper. Parasit.* New York. 1956, Sept., v. 5, No. 5, 421-6.

Since *Toxocara canis* produces liver damage in its host, experiments were carried out to determine whether infection with this nematode would facilitate invasion of the liver by *Entamoeba histolytica*. For this purpose young guineapigs were infected 1-4 weeks previously by oral administration of the nematode larvae (obtained from dogs), followed by intracaecal inoculation of cultures of the amoeba, while control animals received only

the latter. At autopsy, performed at different intervals of the experiment, the caecum and liver were examined macroscopically for the presence of lesions, and portions of the liver were inoculated into culture medium for the detection of amoebic growth.

Caecal infections were produced in 14 (26%) of the 54 tested animals and in 7 (24%) of 29 controls. Growth of amoebae in culture inoculated with liver fragments was obtained from 11 of 12 test animals with caecal ulceration. From a total of 220 cultures from these animals 96 (40%) were positive, as compared with 28 (23%) of 120 cultures made from 3 out of 6 control guineapigs, in which caecal infection was present. On the other hand, no amoebae were recovered from the liver of 19 animals in which there was no caecal ulceration. From these results it is concluded that the nematode infections "may have had a favorable effect on the persistence of amoebae in, or their transport to the liver of animals with caecal infections".

C. A. Hoare

KECHKER, A. S. [**Perforation of the Caecum as a Complication of Balantidial Colitis**] *Med. Parasit. & Parasitic Dis.* Moscow. 1956, v. 25, No. 4, 308-9. [In Russian.]

The author describes a case of acute dysentery, the aetiology of which had not been diagnosed for some time, in the course of which the patient was treated (unsuccessfully) for bacillary dysentery. Subsequently, on examination of the stools, infection with *Balantidium coli* was discovered and the patient was treated with Aminarson [carbarsone] and with gramicidin enemata. This caused the ciliates to disappear from the faeces but did not improve the patient's condition, which was eventually diagnosed as peritonitis. Laparotomy revealed a perforation of the caecum, the walls of which were thickened with hyperaemic mucosa. Although the aperture was stitched and the patient was treated with antibiotics, he died a month after admission to hospital.

Autopsy revealed symptoms of chronic ulcerative colitis with perforation of one of the caecal ulcers. The intestinal wall near the lesions showed typical histopathological changes, but no ciliates could be detected, probably owing to previous treatment with Aminarson and gramicidin.

C. A. Hoare

WAWRZYŃSKI, E., DZIĘCIOŁOWSKI, Z. & KUŹMICKI, R. Tolerancja ustroju przy leczeniu atebryną chorób pasożytniczych przewodu pokarmowego. [**Tolerance to Atebrin in the Treatment of Intestinal Parasitic Infections**] *Wiadomości Parazytologiczne.* Warsaw. 1956, v. 2, No. 6, 357-65. [29 refs.] English summary.

The authors report on the incidence of side-effects in 300 persons undergoing treatment with mepacrine for infection with *Giardia intestinalis* or

Taenia saginata. 12 of 48 persons given 0.1 gm. mepacrine 3 times a day for 5 days developed cholecystitis and gastritis, with jaundice of 8-14 days' duration in 5 instances. A second group of 52 persons were given 0.6 gm. mepacrine over a period of 30 minutes, followed by 0.1 gm. on the evening of the same day, and 0.1 gm. 3 times daily for 2 days; 8 persons complained of asthenia, nausea, vomiting and pain over the liver and stomach. In 2 other groups of 53 and 47 persons the treatment consisted of 3 daily doses of 0.4, 0.4 and 0.6 gm., and 2 daily doses of 0.4 and 0.8 gm., respectively; 68 persons developed symptoms of dyspepsia, cholecystitis, chronic pancreatitis and colitis, with asthenia, jaundice, nausea and vomiting. Acute psychosis developed in a boy aged 13. A final group of 100 persons received 1.0 gm. mepacrine in 100 cc. 1% sodium bicarbonate; 12 developed asthenia, vertigo, jaundice, nausea and vomiting. The patients in the 2nd and 5th groups had also been given glucose and vitamin C, with an apparent reduction in the incidence and severity of the side-effects due to mepacrine. *D. J. Bauer*

RELAPSING FEVER AND OTHER SPIROCHAETOSIS

STARKOFF, O. Primo reperto in Italia di *Ornithodoros erraticus* (Lucas, 1849). [**First Record of *Ornithodoros erraticus* in Italy**] *Nuovi Ann. d'Igiene e Microbiol.* 1956, Nov.-Dec., v. 7, No. 6, 501-2.

The English summary appended to the paper is as follows:—

“The author reports, for the first time in Italy, the presence of *O. erraticus*, found in the country of Grosseto far away from any inhabited place.”

JUAREZ, E. Nueva aportación al tratamiento de la fiebre recurrente española con aureomicina. [**Further Observations on the Treatment of Relapsing Fever in Spain**] *Rev. Sanidad e Hig. Pública.* Madrid. 1956, June-July-Aug., v. 30, Nos. 6, 7 & 8, 489-98.

The author, with FERNANDEZ, has already discussed relapsing fever in Spain and recorded the treatment of 54 patients with aureomycin [this *Bulletin*, 1954, v. 51, 1165].

He now records the treatment of 58 more patients treated with the same dosage in 1954. There were only 5 relapses.

He refers again to the violent reaction which sometimes followed administration of the drug during the febrile period. He suggests that in such cases the initial dose should be reduced to 0.25 gm. and the usual dose of 0.5 gm. every 6 hours given thereafter to a total of 2 gm. (in adults). In elderly persons and those with cardiovascular affections, it is

also necessary to give the drug in the apyrexial period. Follow-up should be maintained for at least 2 months so that relapses may not be overlooked.

H. J. O'D. Burke-Gaffney

GIMENO DE SANDE, A. Campaña profiláctica con gammaexano contra la fiebre recurrente hispanoaficana. [**Prophylactic Use of Benzene Hexachloride against Relapsing Fever in Spain**] *Rev. Sanidad e Hig. Pública*. Madrid. 1956, Jan.-Feb., v. 30, Nos. 1/2, 102-17.

In 1953 and 1954 a house-spraying campaign was carried out in the Spanish province of Córdoba, primarily against the tick vectors of relapsing fever (*Ornithodoros maroccanus*). 21 towns and villages were treated twice, the total area of treated surface being $1\frac{1}{2}$ million square metres. The dosage was 1 gm. BHC (300 mgm. gamma) per square metre. The result was a striking reduction of fever of at least 44%. Of treated farms only 15% of a surveyed group had cases of relapsing fever in 1954, compared with 85% in untreated farms in the group. In the years 1953 and 1954 there were concurrent reductions in malaria and leishmaniasis attributable to the spraying. Also there was a virtual absence of flies throughout the summer, which was possibly responsible for the reduction in typhoid and paratyphoid.

The vital statistic records for Córdoba show that, whereas the infant mortality rate had previously been higher than the average for Spain, in 1954 it was much lower.

Attacks against *Ornithodoros* are by no means easy; 3 treatments are really required each year for 2 or 3 years. It is considered possible that resistance to BHC may occur and suggested that the insecticide dieldrin should be used as an alternative.

[It is very likely that the flies will develop resistance first. If resistance to BHC develops in either flies or ticks, it is likely that simultaneous resistance to dieldrin will occur, so that changing to this insecticide will not avail.]
J. R. Busvine

YAWS AND OTHER TREPONEMATOSES

DE AQUINO, U. M. Intradermorreação na framboésia. II. Natureza da reação e sua especificidade. [**Intradermal Test in Yaws. II. Nature of the Reaction and its Specificity**] *Hospital*. Rio de Janeiro. 1954, Apr., v. 45, No. 4, 451-62, 8 figs. English summary.

The author employs a suspension of tissue from an early infectious proliferative yaws lesion as an antigen for intradermal tests. Early reactions are read after 24, 48 and 72 hours and later reactions after 8,

15, 21 and 30 days. Those tested included 65 suffering from yaws, 29 with tuberculosis and 158 normal controls (105 young adults, 53 school-boys). Positive reactions were obtained in 91% in yaws, 75% in school-boys, 53% in young adults and 73% in the tuberculous. Late reactions were more pronounced in late secondary and early tertiary yaws. They also occurred in healthy young adults but not in the presence of tuberculosis. The author suggests that a late positive result indicates some degree of resistance and immunity to the treponemata but that tuberculosis prevents the occurrence of the reaction. The research continues.

[This test must be regarded primarily as the basis of an investigation into immune reactions and not as an aid to diagnosis.]

[See also this *Bulletin*, 1954, v. 51, 933.] Frederick J. Wright

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

COCHRANE, R. G. **Leprosy: Significant Advances during the Last Decade.** Reprinted from *Med. Press*. 1956, Sept. 12, 18 pp.

CHUNG-HOON, E. K. & HEDGCOCK, Grace. **Racial Aspects of Leprosy and Recent Therapeutic Advances.** *Hawaii Med. J.* 1956, Nov.–Dec., v. 16, No. 2, 125–30, 6 figs. & 3 graphs.

Leprosy was first called "Chinese sickness" in Hawaii, which presumes its first introduction by that race. Its history there goes back to 1866, in which year 141 new cases were discovered, of which 139 were in Hawaiians. By 1946 immigration had diluted the original population stock, so that in the decade ending in 1956 the 271 new cases discovered consisted of the following percentages:—part-Hawaiian 28·7, Hawaiian 20·3, Filipino 24, Japanese 11·1, Caucasian 7·8, Samoan 3·7, Chinese 3, and others 1·4. This, however, should be compared with the morbidity rates (cases per 100,000) in which the Hawaiians were 45·4, the part-Hawaiians 10·6, the Filipinos 17·0, and the Japanese only 1·6. While among the other race groups those with positive and negative bacteriological findings were almost equal in number, among the part-Hawaiians there were 50 positive to 28 negative, and among the Samoans 7 positive to 3 negative. The sex differences are of interest. Among all races taken together the proportion of male to female was about 2 to 1; but among the part-Hawaiians it was 47 to 31, among the Filipinos 62 to 3, and

among the Chinese 7 to 1. Of all races 68% gave a history of 12 months or less, but the Hawaiians, part-Hawaiians and Filipinos were less prone than the Orientals to seek an early diagnosis.

Since the advent of sulphone therapy in 1946 few severe leprous reactions were noted, and only 1 required tracheotomy. "In the past decade 239 of the 271 new patients were treated with sulfones and 221 or 92.5% improved with treatment." Of the 160 patients in hospital receiving chemotherapy 67 (42%) became bacteriologically negative and were discharged, their stay in hospital varying from 6 months to 9 years. By the end of 2 years nearly 60% of the 67 patients had been discharged. "Eleven or 4.6% [of the 239 treated] remained unchanged by therapy and seven or 2.9% became worse." Of the latter 5 exhibited sensitivity to sulphones, 1 had a progressive indeterminate form and 1 had a fatal aplastic anaemia.

Ernest Muir

Lowx, Luela. **Processing of Biopsies for Leprosy Bacilli.** *J. Med. Lab. Technol.* 1956, Oct., v. 13, No. 8, 558-60.

The principal points recommended are as follows. If biopsy specimens are not more than 3 mm. thick they can be fixed in 3 or 4 hours, and dehydrated in the course of 1 day. The fixative found most satisfactory is 40% formaldehyde 10 ml., mercuric chloride 2 gm., acetic acid 7 ml., water 100 ml. Dehydration in 70% alcohol overnight is followed by 2 hours each in 70%, 90%, 95% alcohol and then in absolute alcohol twice repeated. Sections should be uniformly 5 μ thick, placed on slides with albumin-glycerin.

After dehydration soak in cedar oil overnight, followed by benzene for half an hour. There should be 3 changes of wax at 56°C. In de-waxing use fresh xylene from a drop bottle, giving 3 changes of 2 minutes. Rinse in alcohol, wash, remove mercury deposit with iodine followed by thiosulphate, and wash. Add saturated aqueous lithium carbonate solution and wash. After staining with carbol-fuchsin (unheated) for 20 minutes, wash, dry, apply pinene [this *Bulletin*, 1955, v. 52, 51] followed by 25% acetic acid and wash, repeating this sequence as necessary to differentiate, as observed under the $\frac{1}{2}$ -in. objective. Counterstain with 0.02% toluidine or methylene blue for 1 minute, wash and dry. Rinse in xylene and mount.

Ernest Muir

KOOIJ, R. & GERRITSEN, T. **Positive "Lepromin" Reactions with Suspensions of Normal Tissue Particles.** *Internat. J. Leprosy.* New Orleans. 1956, Apr.-June, v. 24, No. 2, 171-81. [19 refs.]

The authors, by using as antigen in the lepromin test suspensions of normal skin in place of the ordinary Mitsuda-Wade suspension, obtained positive early and late reactions in tuberculoid leprosy, though not quite as strong as with the ordinary antigen. The results are shown in tabular

form, the strengths of reactions being measured in millimetres. Experiments were also made, with antigens in the form of suspensions of normal liver as well as suspensions of lepromatous liver and spleen. Although the strength of the reactions varied, all the preparations reacted in the same way.

From their results the authors propound a hypothesis that the Mitsuda phenomenon is a foreign-body reaction, and, if that is correct, then "attempts to find a correlation between the results of the lepromin and tuberculin tests, to prove an immunological relationship between leprosy and tuberculosis, are incorrect".

The authors make a plea for the Madrid congress criteria to be used in reports of lepromin readings, and in any case that the readings be given in millimetres so that comparisons will be possible. *Ernest Muir*

See also p. 550, GUPTA & GUPTA, **Some Observations on Kahn's Universal Serologic Reaction.**

HIBI, H. **Findings in the Leprous Cornea with the Slit-Lamp Microscope.** *Internat. J. Leprosy.* New Orleans. 1956, Apr.-June, v. 24, No. 2, 152-8. [12 refs.]

This study was made at the Nagashima Aiseien National Leprosarium in Japan. The 103 patients were divided into 4 groups according to their age. The anterior part of the eye was examined with the Hartnack loupe, and the results compared with the findings with the biomicroscope. The principal changes found were: (1) thickening of the corneal nerve (beaded effect) in 47%, found in all types of the disease but chiefly in lepromatous leprosy; (2) new vascularization of the limbus in 60%, only found in the lepromatous type; (3) pannus in 49%, but only in the lepromatous type.

It is considered that such examinations may be useful in classifying cases and even in making a diagnosis of leprosy. "... in 8 of 25 lepromatous cases in Group A [age under 15], infiltration in the face and limbus was almost indiscernable and the clinical appearance was of neural leprosy, but with the biomicroscope leprosy changes in the limbus corneae were observed in 6 of them, and pannus corneae in 4."

Ernest Muir

NÈGRE, A. & FONTAN, R. Images radiologiques de lèpre pulmonaire. [**Radiological Images of the Lungs in Leprosy**] *Internat. J. Leprosy.* New Orleans. 1956, Apr.-June, v. 24, No. 2, 167-70, 6 figs. on 3 pls.

Out of 110 leprosy patients who were subjected to radiography of the lungs, the examination being repeated after a year, 3 showed shadows on the second occasion, which occurred during lepra reaction but disappeared after the reaction had subsided. It is considered possible that

these shadows were due to a temporary allergic infiltration similar to reactionary infiltration in the skin. It is suggested that where possible the lungs of leprosy patients should be radiographed, and that this should be repeated whenever they suffer from lepra reaction. *Ernest Muir*

NÈGRE, A. & FONTAN, R. Contribution à l'étude de la pathogenie des lésions osseuses de la lèpre. [**Study of the Pathogenesis of Bony Lesions in Leprosy**] *Internat. J. Leprosy*. New Orleans. 1956, Apr.-June, v. 24, No. 2, 164-6, 4 figs. on pl.

The authors consider that lesions of the small bones of the hands and feet are partly due to small lesions following anaesthesia of the parts, and partly the result of vascular disturbance following neuritis of the supplying nerves. Periodic examinations of radiograms were made of 110 patients, and it was found that between February and June of 1954 considerable degenerative changes had taken place in the bones. It is difficult to remedy this, as it continues even after active disease has been checked by sulphone treatment. *Ernest Muir*

BOSE, D. N. **Trophic Ulcers in Leprosy Patients and their Management.** *Leprosy in India*. 1956, July, v. 28, No. 3, 77-9.

Trophic ulcers in the soles of leprosy patients are divided into categories: the superficial with white hard margin, and the complicated with necrosed bone and septic sinuses. In complicated ulcers the dead bone is removed and the sinuses are opened up, and this is followed by simple dressings for 3 days. In the superficial ulcers the hard tissue is softened and scraped away. Both forms of ulcers are then dressed with sulphanilamide powder, and plaster-of-Paris bandages are applied. The patient can be discharged the next day after the plaster has hardened. If offensive discharge filters through, a window is made in the plaster, dressings are inserted and the window is filled up again with plaster of Paris. The advantages of this method are low cost, less work, rest of affected parts, the patient can attend to his duties and the ulcers heal up more quickly. Of 48 trophic ulcers treated by the author there was relapse only in 2 cases, only 2 had to be replastered and 5 to have the plaster repaired. The average period of retention of plaster was 5 weeks. *Ernest Muir*

NÈGRE, A. & FONTAN, R. Physiothérapie des sequelles et complications de la lèpre. [**Physiotherapy in the Sequelae and Complications of Leprosy**] *Internat. J. Leprosy*. New Orleans. 1956, Apr.-June, v. 24, No. 2, 159-63.

Various forms of electro-therapy were used at the Orafara Sanatorium in Tahiti. The principal conditions treated with benefit were neuritis, perforating ulcers, claw-hand and paralysis. If any one form of treatment is not successful in a patient, another form is substituted. "Morphine,

previously used in large doses in the treatment of neuritis, is no longer in use; 'neuromas' subside after a few treatments; plantar ulcers, even old ones, can be healed in 20 days at most. If there are relapses, the same treatment can be repeated with success."

The various forms of electrotherapy used are: diadynamic, short wave, exponential, infra-red, diathermy, radio-therapy, ultrasonic, ionization with KI or CaCl. It is claimed that in 88% of neuritis cases the patients were cured, often at 1 sitting, by the use of diadynamic therapy, without any later recurrence of pain.

[See also THOMAS, this *Bulletin*, 1954, v. 51, 599, *ter.*] Ernest Muir

FLOCH, H. Injections retard de DDS à "gros grains". [**Large-Grained Slowly-Absorbed Injections of DDS**] *Internat. J. Leprosy*. New Orleans. 1956, Apr.-June, v. 24, No. 2, 145-51. [17 refs.]

The author finds that with injection of DDS suspension he has fewer leprosy reactions than with oral administration. As suspending agent he has tried pea-nut, olive and chaulmoogra oils and also chaulmoogra esters. With these he has got good results, but he prefers an agar-saline menstruum (0.2%) using DDS grains of 90-120 μ , and giving 1.5 gm. every 3 weeks or 1.8 gm. once a month. He does not consider that chaulmoogra menstruum adds to the effectiveness of the DDS.

Ernest Muir

LAURET, L., LAVIRON, P., KERBASTARD, P. & JARDIN, C. Intérêt de la chimiothérapie-retard dans la lutte antihansenienne. [**Interest in Slow-Acting Chemotherapeutic Agents in the Campaign against Leprosy**] *Internat. J. Leprosy*. New Orleans. 1956, Apr.-June, v. 24, No. 2, 138-44.

In French West Africa it is calculated that there are about 250,000 persons with leprosy. To control the disease it is necessary to take the treatment to the patient. This is done by means of mobile units which at the same time deal with malaria, trypanosomiasis, ophthalmic conditions, etc., visits being made once or twice a month.

Experiments as to the most effective methods of administering sulphones to these widespread leprosy patients have been studied for the last 5 years. The question arose as to whether it was better to give DDS tablets to be taken daily or to give twice-monthly injections of a suspension of DDS. At present the treatment for those at long distances away in the bush is 1.25 gm. of DDS suspended in 5 or 6 cc. of ethyl esters of chaulmoogra oil, injected intramuscularly twice a month. In 1955, 36,000 patients received this form of treatment. It is considered that the chaulmoogra adds to the effectiveness of the treatment, and that better results are obtained by these injections than with oral DDS. Treatment with oral DDS, however, is used for those in towns who can attend more

regularly. It may be found possible to extend the interval between injections to once a month, as the drug is very slowly absorbed. [See also this *Bulletin*, 1955, v. 52, 1098.]

Ernest Muir

SHUTTLEWORTH, J. S. **Clinical Studies in the Use of Cortisone and Corticotropin in the Reactive Episodes of Leprosy.** *Internat. J. Leprosy*. New Orleans. 1956, Apr.-June, v. 24, No. 2, 129-37. [18 refs.]

In the National Leprosarium, Carville, 63% of lepromatous patients have erythema nodosum reactions, and of these about 93% occur after sulphone treatment [this *Bulletin*, 1948, v. 45, 613]. Cortisone and corticotrophin were found particularly useful in controlling the more acute reactions, but in the more chronic forms the results have been more doubtful. In neuritis caused by leprosy the value of hormones is very definite, and it may be possible to prevent severe nerve damage if their use is begun in time.

10 cases are detailed showing the effects of these hormones, often when other remedies had failed. The oral dosage of cortisone was 50 mgm. every 6 hours, diminishing to 12.5 mgm. twice daily in one case. In another it was 100 mgm. twice daily, diminishing to 50 mgm. twice daily for a month. One patient was kept on 50 mgm. of cortisone 4 times daily along with diasone for 7 months, the erythema nodosum reaction being successfully suppressed.

Further work on the effects of hormones in controlling leprous neuritis is being undertaken.

Ernest Muir

RAMOS E SILVA, J. Tendances actuelles de la prophylaxie de la lèpre au Brésil. [**Present Trends in the Control of Leprosy in Brazil**] *Brasil-Médico*. 1956, May 5-26, v. 70, Nos. 18/21, 225-30.

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphyllbothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

CAVIER, R. Les propriétés anthelminthiques de quelques esters de l'acide cinnamique et de dérivés voisins. [**Anthelmintic Properties of some Cinnamic Esters and Related Compounds**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 631-6.

Previous studies on the anthelmintic properties of substances of vegetable origin have led the authors to test whether cinnamic aldehyde

and related compounds possessed similar properties. In *in vitro* tests a solution or emulsified suspension of the substances was allowed to act on a faecal culture of *Rhabditis macrocerca*. Solutions of strength M/500 were routinely used and if these solutions failed to kill 50% of the rhabditiform larvae after 1 hour they were considered of no value. Cinnamic acid and 13 of its esters were studied in this way, as well as some mono- and di-chloro, mono- and di-methoxy derivatives.

The results obtained are recorded in tabular form. Increase in anthelmintic power occurred in esters up to the butyl derivative and thereafter diminished with lengthening of chain. Activity was not increased by the presence of an unsaturated linkage in the side chain. The presence of chlorine or methoxy groups appeared to have little effect.

For *in vivo* tests mice infected with oxyurids were treated daily with suspensions of *n*-butyl cinnamate for 6 days and were killed on the 8th day, and the presence or absence of worms in the intestine noted. Complete eradication resulted with doses of 100 mgm./kgm. body weight. In clinical trials a dose of 0.1 gm. per kilo was given on 3 consecutive days, half by mouth and half in suppositories. There were no toxic effects and cure was rapidly effected.

J. D. Fulton

CAVIER, R. & DEBELMAS, A. M. Étude expérimentale du pouvoir anthelminthique de certains aldéhydes aromatiques. [**Anthelmintic Power of Some Aromatic Aldehydes**] *Bull. Soc. Path. Exot.* 1956, July-Aug., v. 49, No. 4, 637-40.

Cinnamic and other aldehydes which occur in certain plants have been tested for anthelmintic properties by the *in vivo* and *in vitro* methods described in the abstract above. In this case the drugs were administered in suspension in gum arabic. The results are set out in tables in which the properties and anthelmintic activity of 13 aldehydes in both tests are given. There was some correlation in the results obtained in both tests. The most active aldehyde was cinnamic, while salicylic and anisic aldehydes showed only slightly less activity but were more toxic to the host. There is a brief discussion on the relation between activity and chemical constitution. Attention is drawn to the influence of the ethylenic linkage in side chains attached to the benzene nucleus.

J. D. Fulton

GÜRSEL, A. Türkiye'de Bilharzioz. [**First Focus of Schistosomiasis in Turkey**] *Türk İhyen ve Tecrübi Biyoloji Dergisi*. Ankara. 1956, v. 16, No. 3, 195-200, 1 map. French summary 200-202.

The presence of vesical schistosomiasis in Syria caused the author, in cooperation with a WHO team, to survey streams and villages in Turkey near the Syrian border for evidence of the disease or the snail hosts of the parasite.

Three streams originated in Turkey and passing into Syria were surveyed. In the neighbourhood of the largest one, the Cagcag, the population of 7 villages were questioned and their urines examined. Haematuria was unknown and all the urines were negative. 5 species of snails were found. These included *Planorbis* [? *Biomphalaria*], but no *Bulinus*. In the Syrian reaches and 3 km. from the Turkish border, *Bulinus* was frequent and infected persons were found.

Similar findings were obtained in the case of the Cerrahi which has 3 sources, 2 of them uniting near the frontier and the third joining them on the frontier.

In the case of the Suruç (which becomes the Sublak in Syria) dead *Bulinus* were found on the Syrian frontier and living *Bulinus* 1,200 metres further on. In the village of Gündüksadik, *Schistosoma haematobium* was found in the urine of 13 of 15 persons examined and in Giribya 2,500 metres higher it was found in one of 8 persons: in the latter village no *Bulinus* were found in the river.

This constitutes the first focus of schistosomiasis recorded in Turkey. It is stated that infection in Syria has been present since 1939-1940, when Senegalese and Malagasy troops were stationed there. In the Turkish villages now surveyed, the disease would seem to have begun some 2 years ago.

H. J. O'D. Burke-Gaffney

GAUD, J. Le problème sanitaire posé par la bilharziose au Maroc. [**The Sanitary Implications of Schistosomiasis in Morocco**] *Maroc Méd.* 1956, Nov., v. 35, No. 378, 1086-91. [13 refs.]

Although urinary schistosomiasis is widespread in the palm groves surrounding the Sahara in Morocco it is not a major public health problem. It is a mild infection fluctuating in incidence from year to year, and occurring in areas which are sparsely populated, of low economic status and with few medical facilities. The incidence in these areas may be taken as between 10% to 20% in children and between 7% and 15% in adults. The disease does not appear to be spreading because no new focus has appeared in the last 15 years in spite of considerable population movement and the creation of new areas of irrigation.

The various possible measures of control are discussed in the light of local circumstances. Mass treatment of the infected is rejected because there is no drug sufficiently free from toxicity. Snail control in the canals would cause the death of the fish, and though these are not eaten the inhabitants would not be willing to use such apparently toxic water. The recommendation made is based on the fact that the disease is one primarily of children who contract it while playing in the water; it is suggested that bathing pools should be constructed on the canals in each palm grove and that these should be protected with copper sulphate.

This measure would considerably reduce infection rates and provide an amenity.

T. H. Davey

BLAIR, D. M. **Bilharziasis Survey in British West and East Africa, Nyasaland and the Rhodesias.** *Bull. World Health Organization.* Geneva. 1956, v. 15, Nos. 1/2, 203-73. [58 refs.]

The first part of this report records the history and present status of knowledge concerning schistosomiasis in the British Commonwealth territories in West, East and Central Africa. The literature for each territory is reviewed and the author's own observations are stated. His opinion is that, in general, infection is of light intensity though localities and individuals may be heavily infected. In newly infected areas the prevalence of *Schistosoma haematobium* does not diminish with age whereas it does in old endemic areas. Recommendations are made for limiting the spread of the infection in areas where irrigation is introduced.

Part II contains a discussion of the findings and draws conclusions. In the countries surveyed information concerning schistosomiasis is inadequate and in most of them little interest is taken because more serious diseases have priority. In all the countries both species of schistosomes are present except in the Gambia where *S. mansoni* does not occur. Field surveys are needed to assess prevalence and these might be confined to schoolchildren. The miracidiascope obviates the necessity for microscopists and gives fairly accurate findings in children but is less reliable in adults. Antigen surveys, with easily prepared and stable cercarial antigen, provide a speedy means of examining populations but need a skilled operator. There is no simple field method of survey for *S. mansoni*; direct examination and miracidial hatching are time-consuming.

The public health importance of schistosomiasis is not known. Clinical symptoms are often accepted as normal by Africans and egg counts are of little value in assessing intensity of infection. Examination at autopsy, particularly caustic potash digests of organs, should be made whenever possible. Though general health does not seem to suffer even with extensive visceral damage, physical exertion may aggravate latent symptoms and cause ill-health. Treatment should be linked with measures to prevent re-infection. Children should receive priority and may conveniently be treated at school with lucanthone hydrochloride. A course of 60 mgm./kgm. in 6 doses over 3 days cured 80% of *S. haematobium* patients in Southern Rhodesia and 100 to 120 mgm./kgm. given over 5 days gave satisfactory cure rates in *S. mansoni*. Intramuscular antimonial treatment is unsatisfactory but given intravenously in intensive courses it produces good results even in *S. mansoni* cases. Intensive treatment by the slow injection technique is becoming more popular and is the best treatment for *S. mansoni*.

Further study of the distribution and habits of vector snails is required. The author records his impression that large bodies of water—lakes and

large rivers—are not suitable habitats for vector snails; the local population becomes parasitized from pools and tributary streams or on the lake shore where it is modified by human activity. This point should be cleared up since health authorities might tackle the smaller foci but are deterred by the expense of treating a lake shore. *T. H. Davey*

ZAVATTARI, E. Malacofauna e schistosomiasi nel medio e basso Giuba. [**Molluscs and Schistosomiasis in the Middle and Lower Juba**] *Riv. di Parassit.* Rome. 1956, Oct., v. 17, No. 4, 193–202, 8 figs. on pl. [14 refs:] English summary (9 lines).

The author, who has an intimate knowledge of what was Italian Somaliland, has explored the middle and lower reaches of the Juba river and although many writers have stated that *Physopsis* were not present in these regions, he found them in very large numbers in the ditches and irrigation canals but not on the main river banks.

In addition, after interrogating the population, he found many who had red urine. He considers that these were cases of urinary schistosomiasis, and this was confirmed clinically in some of the small hospitals at some of the villages.

The intermediate host, like other alleged species of *Physopsis* which he thinks only differ from the type species in minute details, is the snail *Physopsis globosa*. This is the first time that the disease and the intermediate host have definitely been identified in this area.

The author points out that the very large numbers affected make adequate treatment almost impossible, while the proposed extension of cultivation to the upper reaches of the river will mean a further increase in the snail population and in the numbers of people affected.

W. K. Dunscombe

WRIGHT, C. A. **A Note on the Ecology of some Molluscan Intermediate Hosts of African Schistosomiasis.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 346–9. [21 refs.]

It is suggested that most previous reports on the ecology of the tropical fresh-water snails tend to treat bodies of water as “habitats”. Although the physical qualities of natural waters in temperate regions are probably uniform doubt is expressed as to whether this is so in the tropics. Terrestrial ecologists recognize the importance of microhabitats separated from each other by microclimates where temperature and humidity are of importance. The author demonstrates the possibility of the existence of microhabitats in tropical waters. Temperature is obviously of importance, but oxygen tension replaces humidity; rate of flow, concentration of calcium, light intensity, nature of the substratum and pH of the water all play important roles.

The relationship of temperature to the particularly important factor of

oxygen tension is discussed with reference to an example of microhabitat provided for snails at the undersurface of waterlily leaves. Observations with a thermocouple potentiometer show that under sunny conditions the water at the underside of a waterlily leaf is up to 3.7°C . higher than that 2 mm. below the surface of the surrounding water. Under shady conditions the under-leaf temperature may be 1.5°C . lower than the surrounding water. These observations were made in temperate waters and it is suggested that in tropical waters the temperature differences may be greater. Coupled with these temperature variations is the presence beneath the leaf of a thin layer of water of high oxygen tension caused by the diffusion of oxygen from the under-surface. The existence of this layer has been demonstrated by the earlier oxidation of reduced methylene blue at the under-surface of the leaf compared with that of the surrounding solution freely exposed to the air. It is suggested that the existence of such a microclimate would provide a microhabitat suitable for some species of fresh-water snails.

A further example of a microclimate associated with increased oxygen tension is provided by the association of *Bulinus forskali* with the roots of grass and rice plants in Gambia swamps. It has been shown [by others] that rice plants translocate oxygen to their roots for oxidation of the immediate environment. It is considered that instances of predilection for such a habitat by this snail species may be related to a microhabitat with an oxygen tension higher than that of the surrounding water. The tendency for schistosome miracidia to swim near the surface of the water may provide increased opportunity for infection of snails that favour habitats close to the surface and may account for the fact that while *B. forskali* may be infected in the laboratory it has not yet been found naturally infected in the Gambia [this *Bulletin*, 1956, v. 53, 1438].

O. D. Standen

MAKAR, N., **Urological Aspects of Bilharziasis in Egypt.**

This book was reviewed on p. 365.

MYNORS, J. M. **Intestinal Schistosomiasis resembling Regional Ileitis.**

Trans. Roy. Soc. Trop. Med. & Hyg. 1957, Jan., v. 51, No. 1, 45-7, 3-figs. on 2 pls.

A Sudanese, aged 21, had suffered colic and pain in the right iliac fossa and occasional diarrhoea for some months. He had been treated with emetine without effect. On admission to hospital the temperature was 100°F . and there was a mobile tumour under McBurney's point. No abnormality was found in the stools. At operation the terminal ileum and part of the caecum were found to be engorged, thickened and nodular; the adjacent small bowel was oedematous and distended; the mesentery was thickened; and the glands were enlarged. A right hemicolectomy was done and 9 inches of the terminal ileum were removed.

The specimen contained numerous *Schistosoma mansoni* eggs, in association with characteristic histological changes in the tissues involved.

A. R. D. Adams

DE BARROS, O. M., GIANNONI, F. G., MARIGO, C. & FRIZZO, F. J. "Cor pulmonale" e miocardite esquistossomóticas. Considerações clínico-patológicas a propósito de dois casos. [**Schistosomal Cor Pulmonale and Myocarditis**] *Arquivos dos Hosps. Santa Casa de S. Paulo*. 1956, Mar., v. 2, No. 1, 1-40, 24 figs. (1 coloured.) [25 refs.] English summary.

FU, Fu-Yuan, CH'I, Wei-Liang, HO, Teh-Ch'eng, WANG, Chia-Lin & WANG, Ch'uan. **Basophilic Stippling. A Hematological Finding in Tartar Emetic Therapy.** *Chinese Med. J. Peking*. 1956, Nov.-Dec., v. 74, No. 6, 551-4.

An increase of basophilic stippling was noticed in the red cells of patients under treatment with potassium antimony tartrate for *Schistosoma japonicum* infections. The normal incidence is about 4 stippled cells in 50 oil immersion fields (10,000-12,500 red cells). Of 142 patients only 2 showed stippling of 3 and of 5 cells respectively in 50 oil immersion fields; but 66 of them subsequently developed counts of 5 to 160 stippled cells in 50 oil immersion fields midway through a course of tartar emetic treatment. At the end of the treatment another 14 patients had a raised stipple count. No specific associated blood changes were found, and age of the patient, gross dosage of the drug, or toxic reaction to it bore no relationship to the incidence and degree of stippling.

The appearance of basophilic stippling of red cells during antimony treatment, in the absence of more grave findings, is of no serious pathological significance.

A. R. D. Adams

KOANG, N. K., TUNG, T. C., TCH'EN, K. L. & HSÜEH, C. S. **The Use of ACTH in treating Acute Schistosomiasis japonica. A Preliminary Report.** *Chinese Med. J. Peking*. 1956, Nov.-Dec., v. 74, No. 6, 555-9, 2 figs.

The high fever and marked wasting of Far Eastern schistosomiasis do not resolve with antimony treatment and they continue gravely to debilitate the patient. 13 patients in this state, and with bradycardia, liver and spleen enlargements, abdominal pain or cough, were given corticotrophin daily through a slow intravenous drip before and during the antimony treatment. In the first few cases the initial daily dose was 10 mgm., later it was reduced to 5 mgm. or 2.5 mgm., and the maintenance dose was 1 to 2.5 mgm. The injections were continued for 10 to 27 days, and the gross dosages of corticotrophin ranged from 19 to

204 mgm. In all cases the fever subsided within 5 days, commonly within one day; the weight had increased by the completion of the antimony treatment. Side effects of the corticotrophin dosage, in the form of ascites and phlebitis, occurred in only 1 patient.

A. R. D. Adams

DE MEILLON, B. **Infestation by *Fasciola hepatica*.** [Correspondence.] *South African Med. J.* 1957, Jan. 19, v. 31, No. 3, 64.

In the course of this letter the correspondent refers to the statement of LOUW and WILKIE [this *Bulletin*, 1957, v. 54, 458] that no South African cases of *Fasciola hepatica* infections have hitherto been reported. He points out that reference to annual reports of the South African Institute for Medical Research will show that 4 human infections have been reported since 1950 alone. As long ago as 1925, PORTER recovered 3 flukes at autopsy from the bile duct of an African and noted the eggs in the faeces of 2 others [see, for example, this *Bulletin*, 1926, v. 23, 753]. The present correspondent with HOLLAND found one infection in Zululand in 1939 [*ibid.*, 1940, v. 37, 480]. DE MEILLON commends Louw and Wilkie in drawing attention to a condition which may be less rare than is generally believed, and adds that a recent survey of mine recruits "from a certain coastal area" showed that no less than 40 out of 120 were passing ova resembling those of *F. hepatica*.

H. J. O'D. Burke-Gaffney

REDDY, D. B., SUBRAMANYAM, N. T., REDDY, C. R. R. M., BHASKAR, G. R. & RAO, V. K. **Silent *Cysticercus cellulosae* of Brain. Report of Two Cases.** *Indian J. Med. Sci.* 1956, Dec., v. 10, No. 12, 964-6, 3 figs. (2 on pl.).

"1. Two cases of silent *Cysticercus cellulosae* of brain which were incidental necropsy findings are recorded.

"2. Detailed histological study was made in these two cases.

"3. Pathogenesis of these lesions is briefly discussed.

"4. Stress is laid on indications for surgery in such cases when they produce symptoms."

NEGhme, A., SILVA, R. & SILVA, Yolanda. Algunos aspectos epidemiológicos sobre hidatidosis humana en Chile—Años 1953 y 1954. [Some Epidemiological Aspects on Human Hydatid Disease in Chile—Years 1953 and 1954] *Bol. Chileno de Parasit.* 1956, July-Sept., v. 11, No. 3, 42-6.

The English summary appended to the paper is as follows:—

"Further information on the epidemiology of human infection with Hydatid Cyst in Chile is presented. Statistics covering the years 1953

through 1954 obtained from some private and the National Public Health Service hospitals, as well from hospitals sponsored by various other Institutions are reviewed. The data include 6,027 autopsy protocols from Santiago hospitals.

" The following results are obtained from this study:

" 1) 1,093 new cases of Hydatid disease are registered during the period 1953 through 1954; 8.55 and 8.76 being the morbidity rate per 100,000 for each year, respectively.

" 2) The disease is more frequent in the central and southern parts of the country (74.11 and 8.15% of all cases, respectively). This distribution is in agreement with the geographical distribution of cattle Hydatid infection.

" 3) 53.3% of human Hydatid infection occur in males and 46.6% in females. The disease affects mainly individuals ranging from 15 to 45 years of age.

" 4) Approximately 25% of the hospitalized patients died or were discharged as ' not cured '.

" 5) 84 of the 1,093 new cases died. However, Hydatid Cyst infection was not during surgery or due to post-operative complications; the disease was a post-mortem finding in 12 cases.

" 240 patients of 3,521 cases of Hydatid infection died during the period 1945 through 1954, the average lethality being 6.84%.

" 6) The 1,093 patients were hospitalized a total of 54,180 days with an average of 49.6 days per patient."

PERERA Y PRATS, A. Consideraciones sobre el quiste hidatídico de pulmón y su tratamiento actual. [**Observations in Hydatid Cyst of the Lung and Current Treatment**] *Med. Colonial*. Madrid. 1956, Oct. 1, v. 28, No. 4, 240-65, 15 figs.

ZUBIANI, M. & SEBASTIANI, G. Su una rarissima causa di emottisi: l'infestazione da anchilostoma duodenale. [*Ancylostoma duodenale* **Infection as a Rare Cause of Haemoptysis. Report of a Case.** *Ann. Istituto " Carlo Forlanini "*. 1955, v. 15, No. 4, 466-70. [13 refs.] English summary (3 lines).

HARA, K. **Liver Function in Experimental Ancylostomiasis.** *Gunma J. Med. Sci.* Maebashi. 1956, Sept., v. 5, No. 3, 173-89, 5 figs. [48 refs.]

12 mongrels were infected with eggs of *Ancylostoma caninum*. 5 were kept under identical conditions as controls. The dogs were killed 23 to 256 days after infection. Worm loads varied from 11 to 1,333 adults taken at autopsy. All infected animals showed some loss of body weight.

There is no description of the clinical picture and no account of any changes in erythrocyte count or haemoglobin concentration. Measurements of plasma protein and of certain "liver function tests" were made at some unstated point during infection, and histochemical examinations of the livers were carried out. Examinations included: total plasma protein (micro-Kjeldahl); bromsulphthalein [BSP] clearance; Takata and Gross turbidity tests; plasma electrophoresis; histological specimens from the right lobe of the liver (haematoxylin and eosin; sudan III; periodic-Schiff; methyl green pyronin, Feulgen). The findings are discussed.

The parenchymal liver cells were commonly degenerated, vacuolated or necrotic, the changes being largely centrilobular. Kupffer cells contained haemosiderin. The degree of damage was not always proportional to the worm load. There was reduction in ribonucleic and desoxyribonucleic acids and glycogen cell content. The mitochondria were damaged in necrotic cells. Results of BSP-retention and turbidity tests were irregular and were not closely related to obvious physical damage to the hepatic cells. There was a reduction of total protein and of albumin; the fibrinogen was depressed, the β -globulin raised. The level of the γ -globulin was variable; it was appreciably below normal in some animals.

The author concludes that there is hepatic dysfunction as well as anatomical change in this form of ankylostomiasis.

[Information regarding the blood picture in infected animals should have been given, especially in view of the known relation of certain anaemias to the production of centrilobular hepatic damage.]

B. G. Maegraith

TAKAGI, K. **Responses of Adrenal Cortex under the Experimental Parasitic Invasion.** *Gunma J. Med. Sci.* Maebashi. 1956, Sept., v. 5, No. 3, 190-208, 24 figs. [23 refs.]

The author discusses the results of 3 groups of observations: histological examination of (i) the adrenals of 12 dogs infected with *Ancylostoma caninum* and 5 controls [HARA, above], (ii) the adrenals of mice infected with *Trypanosoma gambiense* and *T. evansi*, and (iii) the adrenals of rabbits infected with *Schistosoma japonicum*. A note is added on the examination of the adrenals in 3 cows suffering from *Fasciola hepatica* infection.

In severe cases of all helminthic infections damaged cells were found throughout the adrenal cortex. The affected cells showed coagulative acidophilic and vacuolate changes with pyknotic and broken-up nuclei. Sudanophilic lipids were reduced. In dogs infected with hookworm there was no close relation between the degree of hepatic and adrenocortical damage. The adrenals of mice infected with trypanosomes showed early changes including loss of sudanophilic lipid, corresponding to the so-called "alarm reaction" but the changes did not progress.

The author concludes that the function of the adrenal cortex was

disturbed in the helminthic infections in so far as secretion and storage of steroids was concerned. He suggested this may have resulted from the action of "by-products" of the worms. *B. G. Maegraith*

HOEKENGA, M. T. **Experiments in the Therapy of Human Ascariasis, with particular reference to the Piperazine Salts.** *World Med. J.* New York. 1956, Sept., v. 3, No. 5, 279-83. [15 refs.]

The author tabulates the results of treating 972 patients suffering from ascariasis. Adults and older children treated with 3.0 gm. piperazine citrate in a single dose without starvation or purgation showed a cure rate of 89.7% (68 patients treated). Two doses of 3.0 gm. on consecutive days cured 29 out of 30. Piperazine adipate (3.5 gm. in tablet form) or piperazine phosphate (3.5 gm. in chewable wafers) gave similar results. The follow-up examinations were reasonably exacting and the cure rate obtained with piperazine salts compares favourably with other one-dose anthelmintics of which hexylresorcinol crystoids only produced 42% cures. The author considers, however, that hexylresorcinol crystoids may still have a place in treatment of mixed infections as piperazine salts are relatively ineffective against hookworms and the addition of hexylresorcinol to a piperazine salt increased the cure rate in ascariasis to 94.6% (37 patients treated). In children piperazine citrate shows negligible toxic effects, for adults the more soluble adipate may be safer.

[No indication is given as to the number of worms expelled by the patients.] *Frederick J. Wright*

GREUEL, D. **Piperazin-Vergiftung bei therapeutischer Dosierung.** [Piperazine Poisoning following Prescribed Dosage] *Med. Klin.* 1957, Jan. 25, v. 52, No. 4, 129-30. [16 refs.]

The following is a translation of the author's summary:—

Symptoms of poisoning appeared in a 4-year-old child who had been given moderate doses (as prescribed by the makers) of an anthelmintic containing piperazine citrate. The symptoms disappeared within 48 hours. The administration of such preparations needs to be carefully supervised. *John Rathborn*

PETERSON, G. D., Jr. **The Introduction of Mosquitoes of the Genus *Toxorhynchites* into American Samoa.** *J. Econom. Entom.* 1956, Dec., v. 49, No. 6, 786-9.

In 1955 *Toxorhynchites brevipalpis* and *T. splendens* were bred up in large numbers in captivity in American Samoa and adults released in order

to establish a natural population which, in the predatory larval stage, would control *Aedes pseudoscutellaris*, vector of non-periodic *Wuchereria bancrofti*. Evidence has been obtained that the predatory species are breeding in nature. The paper is mainly concerned with details of the technique for mass-rearing of *Toxorhynchites*. D. S. Bertram

NELSON, G. S. & HEISCH, R. B. **Microfilariae like those of *Wuchereria malayi* in Dogs and Cats in East Africa.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 90.

Sheathed microfilariae resembling those of *Wuchereria malayi* have already been recorded in animals, including dogs and cats, in Malaya [this *Bulletin*, 1956, v. 53, 349].

The present authors now recorded similar sheathed microfilariae of the *W. malayi* type in 7 of 12 domestic cats and 1 of 4 dogs in Patta Island, a few miles east of the northern coast of Kenya. Unsheathed microfilariae were also seen. Sheathed forms of unknown species were found in 2 of 10 donkeys and monkeys were found to be infected with *Dirofilaria aethiops*. Adult worms resembling *W. malayi* were not found in any of these animals.

The people of Patta harbour *W. bancrofti* but no microfilariae of the *W. malayi* type have been found in their blood.

H. J. O'D. Burke-Gaffney

DUKE, B. O. L. & HAWKING, F. **The Effect of Anaesthetics on the Migrations of the Microfilariae of *Loa loa*.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 88-90.

HAWKING had already observed that a general anaesthetic given to a patient with *Loa loa* infection resulted in a decrease of microfilariae in the peripheral blood [this *Bulletin*, 1955, v. 52, 1117]. The authors now record a similar finding in 3 patients in the British Cameroons from whom 50 cmm. of blood was taken during surgical operations and examined at frequent intervals during anaesthesia. A table shows that as soon as the anaesthetic was given, there was a sharp fall in the microfilarial counts amounting to 46%, 68% and 72%, respectively. This is in marked contrast to that found with filarial worms in various animals, in all of which microfilaraemia was greatly increased by an anaesthetic [*ibid.*, 1956, v. 53, 1466]. With *Loa*, maximum periodicity is about noon while with the 3 species of *Dirofilaria* previously recorded it is at night. No immediate effect of an anaesthetic on the microfilarial count has been recorded with *W. bancrofti* infections [*ibid.*, 1948, v. 45, 1101]. The mechanism of these responses is difficult to interpret.

H. J. O'D. Burke-Gaffney

BICKERSTAFF, E. R. **Allergic Basis for Migraine: a Lesson from *Loa loa*.**
[Memoranda.] *Brit. Med. J.* 1957, Feb. 9, 327.

The case report is given of a woman aged 44 years who had suffered intermittently from severe migraine from the age of 14 years but who had had many years of freedom before the illness now recorded. After a period of residence in Nigeria the patient developed typical Calabar swellings and associated eosinophilia, urticarial cutaneous lesions and a return of severe and frequent migraine with hemianopia between the headaches, which sometimes occurred in several short attacks in one day. Promethazine hydrochloride 25 mgm. thrice daily gave dramatic relief from the migraine and after a course of diethylcarbamazine, during which the antihistamine was continued, lasting relief from migraine and cure of loiasis was obtained as evinced by freedom from symptoms during the subsequent 18 months' observation.

The author reasonably associates the recurrence of this patient's migraine with the allergic response of the body to *Loa loa* and draws the conclusion that although antihistamines are often disappointing in the treatment of migraine a search should be made for a possible allergic basis in cases of migraine.

[The diagnosis of loiasis cannot be doubted although, as is frequent in early cases, microfilariae were not found. A complement-fixation test would probably have confirmed a diagnosis of filariasis. The author terms the disease "loasis" not "loiasis" as recommended by MACARTHUR, this *Bulletin*, 1955, v. 52, 1117.]

Frederick J. Wright

THOMPSON, J. H. **ACTH as an Adjunct to the Treatment of Loiasis.**
Amer. J. Trop. Med. & Hyg. 1956, Nov., v. 5, No. 6, 1103-5.

A child of 12, who had acquired a symptomless infection with *Loa loa* in Africa, developed a severe skin reaction and multiple Calabar swellings during a visit to Southern California during the hot weather. Benadryl [diphenhydromine] and "Ace" bandages relieved the urticaria and to some extent the pains in the legs. Specific treatment with diethylcarbamazine was then begun. The next day a severe exacerbation of the Calabar swellings caused almost unbearable pain which was not relieved by the previous treatment. Treatment with corticotrophin at this stage resulted in almost immediate relief of swelling and pain. The combined treatment was continued for 6 days, after which the patient was almost free of symptoms. Diethylcarbamazine alone was continued for a month. The swellings diminished and disappeared in 3 weeks. The patient now feels stronger than she has for some years.

The dosage of diethylcarbamazine was 50 mgm. on the first day, rising gradually to 300 mgm. on the fourth day, at which dose it was maintained. The dosage of corticotrophin ["ACTH Gel"] in international units was, for each of the 6 days in that order, 15 twice daily, 15 twice daily, 10 twice daily, 15, 10 and 5.

The author suggests that this dramatic relief by corticotrophin of symptoms exacerbated by diethylcarbamazine might be confirmed in other places where loiasis is more common, and that a similar result might be found in cases of onchocerciasis. He notes the observation of MARKELL and KERREST [this *Bulletin*, 1956, v. 53, 470] that when patients in Oceania with *Wuchereria bancrofti* infections were treated with cortisone microfilaraemia was greatly increased: he suggests that the "provocative" use of cortisone for 2 or 3 days in suspected cases of filariasis with negative blood films might result in the development of a diagnostic microfilaraemia. Cortisone would not be harmful for this short period if the patient was under medical observation.

H. J. O'D. Burke-Gaffney

CRISP, G. [B.Sc., Ph.D., F.Z.S., F.R.E.S.]. *Simulium and Onchocerciasis in the Northern Territories of the Gold Coast*. With a foreword by Stewart DUKE-ELDER, K.C.V.O., D.Sc., LL.D., M.D., F.R.C.S. pp. xvi + 171, frontispiece, 52 figs. & 5 maps (3 folding). 1956. Published for The British Empire Society for the Blind. London: H. K. Lewis & Co., Ltd., 136, Gower Street, W.C.1. [57s. 6d.]

In 1952 two expert teams, one ophthalmological and one entomological, were sent to the Gold Coast by the British Empire Society for the Blind to work on the problem of onchocerciasis, then only recently recognized as one of the worst of the many community scourges of the hinterland. Dr. Crisp's entomological report is the first of the two to be published. It is a monograph of some 80,000 words, excellently published by the Society itself; it gives the account of a very great amount of original work of interest and importance, and also, as the specific purpose of the work was to evolve a plan for the elimination of the vector fly, there is much detail about the Northern Territories of the Gold Coast. To anyone intending to work there on *Simulium* the report would be an essential *vade mecum*; to anyone seriously interested this summary can only be a guide to what it contains, and an indication of its comprehensiveness and value.

S. damnosum is the main, almost certainly the only, local carrier of onchocerciasis. Its breeding is not confined to large rivers; all that is required is a constant flow of water, a swift current, and suitable supports for the aquatic stages. These conditions can be provided, possibly only for a short season, by streams of even the smallest size. High human infection rates are found at certain places where the nearest fly breeding takes place some distance away, in some cascade breeding for only a short while, and that not every year.

Breeding habits are discussed in great detail: oviposition, average egg batch, duration of all aquatic stages, positions taken up by larvae in the stream, types of vegetation to which they cling, depths of water in which

they thrive, survival in air, migration of aquatic stages, food, relation to stream temperature, turbidity, pH and salt content.

The mystery of the adult fly's resting places was not elucidated, despite much effort. Evidence is given of its flying at least 20 miles, certainly 12. A sheer climb of 600 feet presents no difficulty. Infected flies fly at least 7 miles, and are common at 5 miles from a breeding place. Work begun on infection rates in the fly was dropped, owing to lack of time for the very large number of dissections realized to be necessary for any conclusive results. *S. damnosum* bites man almost exclusively on the legs, regardless of posture or height off the ground. It is also indiscriminatingly zoophilic. Biting activity varies greatly with climate; rise in relative humidity certainly, and drop in barometric pressure probably stimulate the fly, which, however, can be active at low RH. *S. damnosum* does not venture far from the damp riverine microclimate during the dry season, but is very independent of shade during the rains, and is found at least 12 miles from a breeding place.

Evidence is put forward that *S. damnosum* survives the dry season in adult form. The case, admittedly, is not proven, as efforts to find resting places failed. But a great increase in the numbers of adults present was observed (3 times) on the very day that a dry river, remote from contemporary breeding places, had its first flood of the season. Those flies possessed only minute traces of fat body, considered to be a reliable indication that they were aged.

The report ends with a discussion of the effects of heavily endemic onchocerciasis, and of methods available for control or elimination of the fly. A scheme for *Simulium* control in the Northern Territories of the Gold Coast is given in detail. This would occupy 3 years, provided that the work of an experimental first year brings the desired results, and is estimated to cost less than £70,000, a modest sum indeed compared with benefits to be obtained by success. But it must not be forgotten that *S. damnosum* would continue to flourish in surrounding territories, to reinfest the Gold Coast and necessitate perennial control measures. One must hope that a successful local venture will set the example for the widely conceived international plan that West Africa so urgently needs.

B. B. Waddy

CRISP, G. **Observations on the Distribution and Biting Habits of *Simulium damnosum* in the Gold Coast.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 444-50, 6 maps. [19 refs.]

Simulium damnosum is widely distributed along the river systems of the Northern Territories of the Gold Coast and, otherwise, is known only from immediately adjacent Ashanti territory to the south and along the Volta river towards its outlet to the sea. A map illustrates the closely associated incidence of onchocerciasis in man with the fly's distribution, the most heavily infected areas being in the Northern Territories.

Breeding occurs wherever the current of water is swift and suitable rock or plants exist for larval attachment; streams of any size suffice. Such conditions are found on both volcanic and sedimentary formations in the Gold Coast, and from 100 to 800 ft. above sea level. Altitude does not directly affect breeding or the habits of the adults. There is a close association of fly distribution with savannah vegetation. It is suggested that reluctance to feed in forested conditions is a limiting factor of fly behaviour which restricts its main area of distribution to the more open savannah territory so characteristic of the Northern Territories.

D. S. Bertram

CROSSKEY, R. **The Distribution of *Simulium damnosum* Theobald in Northern Nigeria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, July, v. 50, No. 4, 379-92, 6 maps.

The distribution of *Simulium damnosum* in Northern Nigeria is given in the text province by province. Several maps separately relate the distribution of fly to geology, altitude, rainfall, vegetation zones, population density, and river systems and major towns. The distribution of *S. damnosum* breeding is closely associated with pre-Cambrian rock. On this, rivers form suitable rapids, particularly on escarpments and slopes from upland areas to plains; most foci occur between 1,000 and 2,000 ft. above sea level.

The climate is characteristically one of marked dry and rainy seasons. Most foci for fly are found where the dry season lasts not more than 5 months and rainfall is more than 45 inches. Persistence of *S. damnosum* through the dry season appears to be due to limited breeding in residual trickles in some parts of a river system which has otherwise dried up. The rainy season is the time of fly abundance. Absence of suitable breeding conditions, rather than temperature and humidity, is considered to be the limiting factor in fly abundance and distribution except north of 11° or 12° N where very low humidities may also limit invasion by and dispersal of adults. *S. damnosum* and onchocerciasis constitute essentially a rural problem and, almost invariably, the presence of fly is associated with onchocerciasis in man. This is so even for the most northerly record for the fly, in Sokoto Province at 12°10"-12°18" N.

A footnote comments on a high infection rate for onchocerciasis in man in parts of Northern Nigeria where *Simulium bovis* is common and avidly biting man, but *S. damnosum* is scarce.

D. S. Bertram

WILSON, C. **Combatting Onchocerciasis with Little Expense.** *West African Med. J.* 1956, Dec., v. 5 (n.s.), No. 4, 162-6.

In this brief paper is described an eminently practical and inexpensive method of combating (with no pretensions to eradication of the vector)

onchocerciasis in an economically important district of the Cameroons. That DDT is lethal to the larvae of the vector *Simulium* fly found in fast flowing streams is well known. The problem is how to apply the insecticide at the most advantageous places in dense bush terrain at regular intervals with the usual meagre staff available. Various methods were tried and eventually impregnated sawdust balls wrapped in absorbent toilet paper proved to be effective and economical. A 20% solution of DDT in gas oil was prepared; one pint of this is absorbed by 8 sawdust balls.

After survey of the district a map of streams was drawn; every stream source was plotted into areas of a size convenient for dosing from one of the plantations or other centre of activity. A map with sites of application numbered, the number of balls to be thrown in at each site, together with the date, was sent to the person responsible for the application. The frequency was usually once a week during the dry season period of 3 months (January to March).

A check on the effect was maintained by searching for larvae in the streams where the road crossed them at a considerable distance from the source; the finding of 4th instar larvae was followed by an increase of dosage at the site of application.

Without question there was a marked decrease in the *Simulium* fly population during the time of year when the biting nuisance is normally intense. As a result of this experience it is intended to institute a regular annual programme of 15 weekly dosages preceding the onset of the wet season.

R. Ford Tredre

DRURY, M. I. **Trichiniasis.** *Irish J. Med. Sci.* 1957, Feb., 6th Ser., No. 374, 84-5. Discussion 85-6.

This case of trichinosis appears to be the first recorded in Ireland. The patient, an army officer in the Curragh Camp, Co. Kildare, was suffering from frontal headache, oedema of the eyelids, change of personality and muscle tenderness. The last feature, together with an eosinophilia of 70% suggested trichinosis, and a biopsy of the pectoralis major revealed the presence of encysted larvae. The source of the infection was not clear: in the discussion which followed the paper MACPARLAND stated that a careful survey of a local slaughterhouse and pig farms did not reveal any positive evidence. In the same discussion FURNELL stated that some time afterwards 5 more cases (1 fatal) were observed in Limerick and one infected rat was also found. The 5 patients diagnosed in Limerick came from the North Riding of Tipperary and it may be significant that the officer who was the original patient had passed through North Tipperary 6 weeks before his illness and had eaten sausages there.

The author suggests that trichinosis may not in fact be rare in Ireland

and that the diagnosis should be borne in mind in cases presenting features such as those described. *H. J. O'D. Burke-Gaffney*

AGOSIN, M., with the technical assistance of Luisa ARAVENA & G. CORTÉS. **Studies on the Cytochrome System of *Trichinella spiralis*.** *Bol. Chileno de Parasit.* 1956, July-Sept., v. 11, No. 3, 46-51, 1 fig. [23 refs.]

NORMAN, Lois. **Effect of Dehydration and Storage on Reagents used in the Bentonite Flocculation Test for Trichinosis.** *Pub. Health Lab.* 1956, Nov., v. 14, No. 6, 157-61.

"Standardized methods of preparing and freeze-drying uniform-sized bentonite particles, antigen, and antisera for use in the bentonite flocculation test for trichinosis are described. The lyophilized bentonite particles, after storage up to 1 year, were found to adsorb antigen satisfactorily and to react in the same manner as freshly prepared bentonite suspensions. The dehydrated antigen could be stored at least 9 months without evidence of deterioration. Positive and negative sera from human and rabbit infections showed no change of reactivity after storage up to 1 year and could be used for standardization of the flocculation test. On the basis of these observations, these reagents can be prepared in a central laboratory for use in local diagnostic laboratories where time and/or facilities for their preparation are not available."

[See this *Bulletin*, 1956, v. 53, 1371.]

DEFICIENCY DISEASES

BERGERET, B. Les marchés Bamiléké de saison sèche. Rapport de tournée. [The Markets of Bamiléké in the Dry Seasons] *Méd. Trop.* Marseilles. 1956, Sept.-Oct., v. 16, No. 5, 698-708.

This is a report of a tour through Bamiléké, which is a rich district in French Equatorial Africa. The foods commonly consumed are listed with their vernacular and scientific names. An adequate supply of animal foods and fresh vegetables and fruit enabled the general level of the diet to be good.

R. Passmore

GRUSIN, H. **Clinical Aspect of Scurvy.** *South African Practitioner.* 1956, June-July, v. 1, No. 4, 335-8, 1 fig.

Scurvy is not often seen nowadays, but is fairly common among South African Bantu. The author gives a clinical description of cases in the

Baragwanath Hospital, Johannesburg, between 1952 and 1955: about 40 cases are seen there every year. It is commonest in men, and children seem to be immune. It is added that, although these age and sex peculiarities have not been satisfactorily explained, protective quantities of vitamin C have been found in the blood of Bantu infants, in the South African Institute of Medical Research, whose diet apparently contains none of it. The disease is more frequent in the spring and early summer.

The clinical features of muscle haemorrhage, general bleeding tendency, gum changes, and anaemia are present in about two-thirds of the patients. The remainder show some of these signs in isolation, and this makes diagnosis difficult. There are also obscure conditions such as isolated idiopathic haemorrhage and osteoporosis of the skeleton which occur in the Bantu and a causal relation to scurvy is suggested.

Many Africans may have mild attacks of scurvy without knowing it: 5 such cases are mentioned. It seems that many such Africans may live in a "sub-scurvy" state which is detrimental to their well being. The disease responds dramatically to ascorbic acid given intramuscularly. The author suggests that 100 mgm. daily by mouth might be equally effective with the 500 mgm. daily which was given by injection, and would avoid the development of occasional abscesses. The patients in the acute stage should be kept in bed until clinical evidence of anaemia disappears (about 10 to 14 days). This surveillance is important as patients in the acute stage may suddenly collapse and die without warning.

It is suggested that Africans be given a daily supplement of ascorbic acid. This would cost very little and might make a considerable difference to their well-being.

H. J. O'D. Burke-Gaffney

PLAGNOL, H. & DUTRENIT, J. La thiamine dans le lait des nourrices vietnamiennes. (Étude faite dans une collectivité de réfugiés du Nord-Vietnam.) [**Thiamine in the Milk of Vietnam Nursing Mothers (a Study in a Group of Refugees from North Vietnam)**] *Méd. Trop.* Marseilles. 1956, Sept.-Oct., v. 16, No. 5, 690-97. [21 refs.]

The thiamine content of samples of milk from 15 healthy mothers with healthy children (group I) and from 11 mothers with clinical evidence of lack of vitamin B₁, whose infants were being treated for ailments thought to be due to this deficiency (group II) was measured. The results were:

Thiamine Content of Milk (μgm./l.)

	Early weeks		Established lactation	
	Mean	Range	Mean	Range
Group I	132	62-250	172	146-208
Group II	94	51-175	108	6-250

The results are compared with those of other workers. The figures in group I are very similar to results obtained from milk of British mothers.

There was a great individual variation, especially in group II. In some of these milks the thiamine content was very low. *R. Passmore*

LUCKNER, H. & MAGUN, R. Fehlernährung und Erkrankung peripherer Nerven. [**Malnutrition and Peripheral Nerve Disease**] *Deut. med. Woch.* 1957, Feb. 1 & 8, v. 82, Nos. 5 & 6, 173-7; 208-11, 235-6, 2 figs. [Numerous refs.]

The English summary appended to the paper is as follows:—

“Clinical and statistical methods have been used to investigate in 191 patients examined during 1943-1955, the relationship between malnutrition and diseases of the peripheral nerves. An observed increase in polyneuropathies corresponded to an increase in the incidence of diphtheria. Not a single form of polyneuropathy, not even the so-called essential one, could be shown to have any causative relationship to any type of malnutrition. In 25 patients with diabetic neuropathies neither calorie deficiency nor lack of vitamins could be demonstrated.

“The attempt was made to produce a polyneuropathy in animal experiments by means of specific forms of malnutrition. Previously it had been shown that a diet deficient in both protein and B₁ produced hydrops and the cardiovascular lesions of beri-beri in animals. It was unsuccessfully tried to produce damage to peripheral nerves by several variations of this complex kind of malnutrition.

“It is concluded from the authors' own experimental and clinical observations and those of other investigators that there is no evidence for any form of polyneuropathy, including that associated with beri-beri, being caused by the lack of a specific constituent of food or some more complex form of malnutrition.”

KAHN, E., STEIN, H. & ZOUTENDYK, A. **Isohemagglutinins and Immunity in Malnutrition.** *Amer. J. Clin. Nutrition.* 1957, Jan.-Feb., v. 5, No. 1, 70-71.

“Malnourished children appear to have a poor resistance to infection. In order to determine whether this is due to impaired antibody production the isohemagglutinin titers of 14 severely malnourished children were examined. These titers were within normal limits. This seems to confirm findings of other authors that in man, unlike laboratory animals, malnutrition does not impair immune-body production.”

See also p. 531, BEZON, Résultats d'une enquête sur la fréquence des hépatomégalies chez l'enfant Kabré de moins de 15 ans. (Cercle de

Lama-Kara—Togo.) [Results of an Investigation into the Frequency of Hepatomegaly among Kabré Children under 15 Years of Age (Lama-Kara District, Togo]

HAEMATOLOGY

NICOL, B. M. An Evaluation of the Specific Gravity Method for estimating the Haemoglobin, Packed Cell Volume and Total Plasma Protein Concentrations of Blood. *West African Med. J.* 1956, Dec., v. 5 (n.s.), No. 4, 157-61, 2 figs.

"1. The haemoglobin content of oxalated blood samples from 66 ambulant Nigerian peasants and from 8 hospital patients was estimated by (a) the M.R.C. grey-wedge photometer and (b) by the copper sulphate specific gravity method described by Van Slyke and his colleagues.

"2. The total plasma protein concentration of 7 of the ambulant subjects and of 4 of the hospital patients was estimated by (a) micro-electrophoresis (Antweiler) and (b) by the copper sulphate specific gravity method.

"3. The results obtained by these different methods were in good agreement.

"4. It is concluded that the specific gravity method for estimating the haemoglobin content and total plasma protein concentration of blood samples is very suitable for field work provided the copper sulphate solutions are correctly prepared."

LINHARD, J. Normes hématologiques des Africains. [**Haematological Values in Africans**] *Méd. Afrique Noire*. Dakar. 1956, Dec. 16-31, v. 3, No. 63, 3-8.

When the blood of 400 healthy male African donors was examined at the Blood Transfusion Centre in Dakar it was found that it was normal in most respects. There was no difference from the values considered normal in Europeans when the following were determined: cell count, mean cell diameter, reticulocyte count, haemoglobin level, colour index, MCH, MCHC, sedimentation rate, PCV, MCV, osmotic fragility, specific gravity of whole blood and of plasma. Only the viscosity seemed about 25% higher than that considered normal in Europeans. The leucocytes also were somewhat different in showing marked lymphocytosis, eosinophilia and neutropenia. There was no difference in the composition of the bone-marrow, and most tests for blood coagulation were normal with the one exception that the prothrombin time was prolonged, the value

for prothrombin being 67% of that accepted as normal in Europeans. In 31 sickle-cell-trait carriers no outstanding abnormality was seen beyond the positive sickle-cell test.

H. Lehmann

DEEGAN, T., GILLES, H. M. & MCGREGOR, I. A. **Observations on the Erythrocyte Sedimentation Rates and Blood Protein Patterns of Gambian Africans.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 451-61. [17 refs.]

The blood of 2 groups of adult Africans, who were apparently in normal health and whose blood did not contain malaria parasites in high density, was investigated. The erythrocyte sedimentation rates [ESR] were determined by the Wintrobe and also the Westergren methods and the serum protein and electrophoretic patterns of serum proteins were determined. The results confirm earlier work MCGREGOR and DEEGAN [this *Bulletin*, 1954, v. 51, 1187] that the ESR shows higher levels than in normal European controls. It also showed that there is an increase of gamma globulin at the expense of the other globulin fractions. In addition there was found an increased fibrinogen level which may be related to the raised ESR. The cause of the increased gamma globulin content is not yet clear; changes due to holoendemic malaria may persist in the absence of heavy parasitaemia and in addition other endemic diseases and malnutrition are common.

Frederick J. Wright

ROBERTS, D. F. & SMITH, D. A. **A Haematological Study of some Nilotic Peoples of the Southern Sudan.** *J. Trop. Med. & Hyg.* 1957, Feb., v. 60, No. 2, 45-51, 1 map. [28 refs.]

In about 100 Dinka and Shilluk, both groups in Southern Sudan, estimations were made of the haemoglobin level, the plasma protein concentration and the packed cell volume. Blood was collected in venules containing Wintrobe's oxalate mixture and sent by air in thermos flasks with ice to Khartoum for examination. The samples were taken from 3 Dinka tribes and from 7 Shilluk villages. The mean haemoglobin level of the Dinka males was 15.53 gm., and that of the Shilluk males 14.72 gm. per 100 ml. The difference is statistically significant. The most likely explanation is, according to the authors, a difference in diet. The Dinka live largely by cattle-breeding whereas the Shilluk are predominantly agricultural. Within the Dinka 25 Ruweng whose main interest is their cattle had a haemoglobin level of 16.79 gm./100 ml., and 29 Ageir who implement their herds with the proceeds of cash cropping had a haemoglobin level of 14.87 gm. per 100 ml. Their difference also was statistically significant. The plasma protein concentration was high throughout, about 9 gm. per 100 ml. It is suggested that this finding reflects a high globulin level due to the heavy exposure of the subjects

to parasitic infection. Malaria parasites and hookworms are commonly found in patients seeking dispensary treatment for other diseases. *Schistosoma haematobium* (rarely) and *Schistosoma mansoni* (more commonly), *Ascaris*, *Taenia*, *Entamoeba histolytica*, filarial worms and leishmaniasis are all present. The weight of infection is unknown, but levels of haemoglobin recorded suggest that if there is a substantial loss of blood due to parasites, there is also a generally adequate supply of nutrients for its regeneration.

These considerations may help to explain the finding of an increased packed cell volume [PCV] in nearly all groups. With one exception the values were all above 50%. Moreover, the packed cell volumes were disproportionately high compared with the haemoglobin levels, with consequently low values for the mean corpuscular haemoglobin concentration (MCHC). It is suggested that a condition prevails where the cells are large and pale giving rise to a raised PCV with a low MCHC. This type of macrocytosis and hypochromia is found when the bone-marrow produces cells not fully ripened in an effort to compensate for a peripheral blood loss due to parasites, and where there is no shortage of haemopoietic factors.

H. Lehmann

NEEL, J. V. **Human Hemoglobin Types. Their Epidemiologic Implications.** *New England J. of Med.* 1957, Jan. 24, v. 256, No. 4, 161-71, 6 figs. [100 refs.]

VELLA, F. **Human Haemoglobins. A Clinical and Biochemical Review.** *Proc. Alumni Ass., Malaya.* 1956, Dec., v. 9, No. 4, 242-67. [177 refs.]

ALLISON, A. C. **Properties of Sickle-Cell Haemoglobin.** *Biochem. J.* 1957, Feb., v. 65, No. 2, 212-19, 5 figs. [26 refs.]

EDINGTON, G. M., & LEHMANN, H. **Sickle-Cell Trait and Malaria in Africa.** *Bull. World Health Organization.* Geneva. 1956, v. 15, Nos. 3, 4 & 5, 837-42. [Refs. in footnotes.]

This paper, by two recognized authorities on the subject, reviews in condensed form the principal studies on the abnormal haemoglobins with which readers of this *Bulletin* will have been familiar in recent years.

They set out the conditions in which these haemoglobins are seen, their incidence and significance, with special references to the investigations on the relation of the sickling trait to malarial infection. They point out the further problems that have already arisen in this connexion and their possible significance.

This survey will prove extremely valuable to those who wish to keep up to date in this increasingly complex problem.

H. J. O'D. Burke-Gaffney

LIE-INJO LUAN ENG. **Sickle Cell Gene in Indonesia.** [Correspondence.] *Nature*. 1957, Feb. 16, v. 179, 381.

This is a record of 2 sickle-cell trait carriers discovered during examination of over 4,000 samples of blood. One subject was born in Java of mixed Chinese-Indonesian parentage, the other was from Sumatra and was pure Indonesian.

The implications of these findings are discussed.

SCHNEIDER, Rose G. **Incidence of Electrophoretically Distinct Abnormalities of Hemoglobin in 1550 Negro Hospital Patients.** *Amer. J. Clin. Path.* 1956, Nov., v. 26, No. 11, 1270-76, 3 figs. [25 refs.]

"1. The incidences of the electrophoretically distinct abnormalities of hemoglobin were determined in 1550 hospitalized Negro patients. Among the 1550 persons, there was an incidence of 9.0 per cent for sickle cell trait and 2.3 per cent for hemoglobin C trait.

"2. In the 505 patients from the obstetric service (selected control group), the frequency of sickle cell trait was 9.5 per cent, and that for hemoglobin C trait was 2 per cent. These figures are not significantly different, respectively, from those of 8.7 per cent and 2.4 per cent for the 1045 patients from the other services in the hospital.

"3. Among the 1045 patients from services other than the obstetric division, there were 4 persons with sickle cell anemia, and 1 with sickle cell hemoglobin C disease. The hemoglobin of 2 patients in this group yielded the characteristic electrophoretic pattern of sickle cell thalassemia disease, but the clinical diagnosis was not conclusively established."

EASTON, J. G. & WRIGHT, Phyllis M. **Cholelithiasis complicating Sickle-Cell Anemia.** *J. Dis. Children*. Chicago. 1957, Jan., v. 93, No. 1, 87-9, 1 fig.

"A case is presented demonstrating cholelithiasis as a complication of sickle-cell disease in a 13-year-old girl. Although abdominal pain is a common complaint during the course of many childhood illnesses and is especially common in children with sickle-cell disease, it is suggested that cholelithiasis be considered as a possible cause and that cholecystograms be done with this in mind. The case presented above lends support to the recent trend away from the use of blood transfusions in the management of sickle-cell crisis."

JENSEN, W. N., SCHOEFIELD, R. A. & AGNER, R. **Clinical and Necropsy Findings in Hemoglobin C Disease.** *Blood*. 1957, Jan., v. 12, No. 1, 74-83, 6 figs. [30 refs.]

Whereas there are numerous studies available of the post-mortem findings in sickle-cell disease, little is known of the morbid anatomy in the other haemoglobinopathies. This paper describes a thorough investigation of haemoglobin C disease in an American Negro 58 years old. As the patient died a month later with symptoms consistent with myocardial infarction, it was possible to perform a detailed examination of organs and tissues.

The most notable findings were, in the spleen loss of follicular substance around the artery and congestion of the sinuses by erythrocytes, and in the lungs the presence of thrombi in all the large arteries with either recanalized or fully occluding thrombi in some of the smaller vessels. The findings *in vivo* did not differ from those now amply reported in nearly three dozen cases of haemoglobin C disease described in the literature. There were some additional observations. On treatment with compound E [cortisone] there was an increase in the red cell mass with a substantial increase in plasma iron turnover rate. When treatment was discontinued there was a prompt return to the values seen on admission. The myoglobin of the patient did not differ in its electrophoretic properties from normal myoglobin.

H. Lehmann

SWEENEY, W. M., CRIPPEN, D. A., CHRISTIANSON, J. F. & COOKE, L. B., Jr. **Sickle Cell-Hemoglobin C Disease with Splenic Infarction following High Altitude Ascent.** *U.S. Armed Forces Med. J.* 1957, Jan., v. 8, No. 1, 109-13. [18 refs.]

[See also this *Bulletin*, 1956, v. 53, 1477.]

HUISMAN, T. H. J., NOORDHOEK, K. & DA COSTA, G. J. **A Case of Haemoglobin J in an Indonesian Family.** [Correspondence.] *Nature*. 1957, Feb. 9, v. 179, 322-3, 1 fig.

SILVESTRONI, E. & BIANCO, I. Il problema del morbo di Cooley e delle anemie microcitemiche in Italia. Nota I.—Aspetti clinici, ematologici e genetici. [Cooley's Anaemia and Microcytaemia in Italy. I. Clinical, Haematological and Genetic Aspects] *Igiene e San. Pubblica*. Rome. 1956, Sept.-Oct., v. 12, Nos. 9/10, 522-30. [63 refs.] English summary.

STURGEON, P. & FINCH, C. A. **Erythrokinetics in Cooley's Anemia.**
Blood. 1957, Jan., v. 12, No. 1, 64-73, 2 figs. [33 refs.]

"Blood production and destruction have been measured in four patients with Cooley's anemia. Methods employed included the determination of erythroid-myeloid ratio of the marrow, reticulocyte count, plasma iron turnover and red cell utilization, Cr⁵¹ survival and fecal urobilinogen. Rates of production obtained by these measurements have been compared to normal.

"Patients with Cooley's anemia have been shown to have an increased turnover of hemoglobin constituents comparable to the maximal response seen in other hemolytic anemias. There is, however, a marked decrease in maximal delivery of erythrocytes to the peripheral blood amounting to about 50 per cent in the mildly anemic patients and 85 per cent in severely anemic patients. The rate of destruction of circulating erythrocytes was similar in the three patients studied. The severity of anemia was therefore largely related to the production defect.

"It was concluded that the defect in Cooley's anemia is not in total hemoglobin synthesis, but in the fabrication of circulating erythrocytes, which in turn have the associated manifestations of hypochromia, increased percentage of fetal hemoglobin and shortened survival time."

VENOMS AND ANTIVENENES

BALOZET, L. L'hémolymph de scorpions n'a pas de pouvoir antitoxique à l'égard du venin de ces Arachnides. [**Failure of Scorpion Haemolymph to neutralize Venom of the Species**] *Arch. Inst. Pasteur d'Algérie.* 1956, Sept., v. 34, No. 3, 360-69, 1 fig. [20 refs.]

A study was made of the haemolymph of the scorpion *Androctonus australis* as an antitoxic agent to the venom of this species. The following conclusions were reached:—(1) scorpion venom is toxic for scorpions of the same species but in the absence of valid comparisons no assessment of sensibility can be made; (2) haemolymph of *A. australis* is toxic for mice, a dose of 0.3 cc. producing temporary effects of a mild nature and doses of 0.5 cc. and 1.0 cc. proving fatal to 3 mice out of 4; (3) haemolymph of *A. australis* fails completely to neutralize venom of the species when it is studied by the technique used by IPSEN [this *Bulletin*, 1939, v. 36, 861] for titrating antivenene at the Pasteur Institute of Algeria.

John Rathborn

TOXOPLASMOSIS

BAIN, A. D., BOWIE, J. H., FLINT, W. F., BEVERLEY, J. K. A. & BEATTIE, C. P. **Congenital Toxoplasmosis simulating Haemolytic Disease of the Newborn.** Reprinted from *J. Obstet. & Gynaecol. Brit. Empire*. 1956, Dec., v. 63, No. 6, 826-32, 8 figs. on 4 pls. [35 refs.]

In this paper attention is drawn to the diagnostic difficulties which may be encountered in congenital toxoplasmosis in the newborn baby. Three illustrative cases are described, a stillborn baby, one who died immediately after birth and a stillborn macerated foetus of 30 weeks' gestation. In the first two cases toxoplasms were isolated and in the third the serological tests on the mother's serum were diagnostic of toxoplasmosis but attempted isolation of toxoplasms from the foetus was unsuccessful. Clinically all 3 infants had splenomegaly, two had hepatomegaly and in the first two the placenta was large and flabby, giving rise to a suspicion of haemolytic disease of the newborn.

I. A. B. Cathie

GRÖNROOS, P. **Studies on *Toxoplasma* and the Serology of Toxoplasmosis.** *Ann. Med. Exper. et Biol. Fenniae*. Helsinki. 1955, v. 33, Suppl. 11, 113 pp., 8 figs. [195 refs.]

This monograph consists of a study of the epidemiology of toxoplasmosis largely based on serological data and relating to the author's experiences in Finland. It begins with useful sections on the morphology of the organism and its taxonomic position. The latter is still unsettled, though nearly all workers today agree that *Toxoplasma* is a protozoon; it should probably not be placed in the sporozoa because it is non-host-specific and possesses no sexual cycle.

Details are given of the way in which the author used the complement-fixation, toxoplasmin skin, and dye tests—based on the usual procedures but with slight modifications; the sensitivity of the tests in the above list is in ascending order. The mechanism of the dye test is still not properly understood, nor is its specificity certain. It seems as if a soluble fraction of the organisms is responsible for stimulating the production of the cytoplasm-modifying antibodies. The part played by properdin in the reaction is discussed.

The last part of the monograph deals with serological investigations in Finland over a period of 4 years, and in the final analysis, sera from cases of possible toxoplasmosis were excluded. In the age-group 20-39 years, positive dye tests were obtained in 22.7% and complement-fixation reactions in 13.3%. There was no appreciable difference in the rates in the various social groups or among urban and rural populations (nor even in occupational groups in close contact with animals or meat). Material

collected from the city of Turku in South West Finland showed a higher incidence of infection (47%) than elsewhere in the country. The percentage of people with a positive dye test increases until the age of 30 and then remains practically unchanged; the percentage of people with a positive complement-fixation reaction reaches a maximum a decade earlier. The highest titres were found in women; there were 5 cases with a dye test titre of 1 in 16,389 and a complement fixation of 1 in 128.

Each section of the monograph includes a useful review of the literature based on 195 references.

P. C. C. Garnham

GIBSON, C. L., EYLES, D. E., COLEMAN, Nell & SMITH, C. S. **Serological Response of a Rural Negro Population to the Sabin-Feldman Cytoplasm-Modifying Test for Toxoplasmosis.** *Amer. J. Trop. Med. & Hyg.* 1956, Sept., v. 5, No. 5, 772-83, 4 figs. [22 refs.]

The authors describe the results of a serological survey for the incidence of toxoplasmosis among the rural Negro population of a county in Tennessee, for which 987 samples of sera were available, representing both sexes and various age-groups (from 1 to upwards of 60 years). The sera were subjected to the dye test, undiluted and at progressive 4-fold dilutions, from 1 in 4 to the end point. The results were as follows: (1) there was no difference in the percentage of positive sera from males and females (22.5% and 21.0%, respectively); (2) with the exception of the youngest age-group (1-5 years), the occurrence of positive sera increased progressively with the age of the persons examined, from 16.3% in the 6-9 years group to 65% in the oldest (60+ years) group; (3) there was found a shift in modal titre, for in younger persons there were fewer positive sera but their titres were higher, whereas older persons had more positive sera with lower titres: the significance of this shift was confirmed statistically; (4) the distribution of titres was bi-modal, with a very large number represented by undiluted positive sera; (5) among all the persons whose sera were tested, positive reactions were obtained in 29.9%, and 21.8% had titres upwards of 1 in 16.

The results are illustrated in a number of tables and graphs.

C. A. Hoare

PANGALOS, G. E., PAVLATOS, M. & MERCIER, P. **The Sabin-Feldman Dye-Test.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Nov., v. 50, No. 6, 583-6.

In view of some of the difficulties involved in carrying out the standard dye test for toxoplasmosis, the authors have devised a new technique, which enables the reading of the results to be made from fixed and stained preparations, which can be examined at any time. The procedure is as follows: the serum to be tested is prepared in various dilutions (from 1:16 upwards); 0.1 ml. amounts of these are placed in tubes, to each of which

0.1 ml. of toxoplasm suspension + normal human serum (for "accessory factor") is added; then the tubes are incubated for 1 hr. at 37°C. A drop of the mixture is then spread into a film on a slide and fixed in Hoffman's solution, after which the smear is stained by the May-Grünwald-Giemsa method.

In normal toxoplasms the nucleus stains purple-red and the cytoplasm is blue, whereas in parasites subjected to the action of antibody the nucleus is also stained but the cytoplasm remains colourless: in some individuals it is surrounded by a lightly stained peripheral zone, in others the body is swollen and the cytoplasm is pinkish, while the peripheral zone is attached to it in the form of a tail. In all cases the difference between the normal parasites and those affected by antibody can be clearly distinguished. In the authors' interpretation, the antibody first causes the cytoplasm of the parasite to swell, after which its extrusion (plasmoptysis) takes place. The alteration of the cytoplasm is regarded as a change of its physico-chemical state, whereby it loses affinity for the alkaline dye. This is followed by partial lysis of the cytoplasm and plasmoptysis.

Parallel tests of the same serum by the standard dye test and by new method produced comparable results with the same titres. C. A. Hoare

VAN SOESTBERGEN, A. A., **Over de reactie van Sabin en Feldman. Een analyse van de resultaten verkregen bij titratie van Toxoplasma—antilichaam in mensenserum.**

This book was reviewed on p. 345.

VAN THIEL, P. H. & VAN DER WAAIJ, D. **The Significance of Pseudocysts in the Oral Infection of Man and Animals with *Toxoplasma gondii*.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1956, Dec., v. 8, No. 4, 392-6. [18 refs.]

Fasting mice and guineapigs were fed with a mash mixed with brains of mice containing pseudocysts of *Toxoplasma gondii* (of 2 avirulent strains, Denekamp and Burk). The donor mice had been infected 8 to 20 months earlier. Of 37 mice and 2 guineapigs fed in this way, 23 mice and both guineapigs contracted the disease. Pseudocysts were demonstrable in the stomach contents half an hour after feeding on infected brain alone, and in the duodenum after one hour. Oral infection with free *Toxoplasma gondii*, on the other hand, was difficult to establish. LAINSON [*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1955, v. 49, 296] has shown that pseudocysts are often present in the alveoli of the lungs; the authors therefore tested the infectivity of faeces of chronically infected mice to see if viable pseudocysts passed out through the faeces, but the results were negative.

[SCHMIDTKE (this *Bulletin*, 1956, v. 53, 1168) states that she fed pseudocysts of *Toxoplasma* to mice with negative results; the authors

think that these results are erroneous because she was using a very virulent strain in which pseudocysts were unlikely to be present.]

P. C. C. Garnham

WILDFÜHR, G. Experimentelle Versuche zur Resistenz der Toxoplasmen. [Experimental Investigation of the Resistance of Toxoplasms] *Ztschr. f. Hyg. u. Infektionskr.* 1956, v. 143, No. 2, 134-9.

Since the resistance of *Toxoplasma* to external conditions is an important epidemiological factor in the transmission of the infection, the author carried out experiments on the effect upon the parasite of desiccation, temperature and humidity. The material for these experiments consisted of peritoneal exudate of infected mice. The viability and virulence of the parasite after treatment were tested by intraperitoneal inoculation of mice or feeding of hamsters.

The results were as follows. Parasites from exudate dried in a desiccator, when kept at 4°C., remained fully virulent for mice after 8 hours, but less so after 12 hours, whereas after 24 hours they were no longer infective. On the other hand, when kept at room temperature (18-20°C.) or in the incubator (37°C.), they lost their infectivity after 8 hours and $\frac{1}{2}$ hour respectively. If the exudate was prevented from drying (in a moist chamber) the viability of the parasites was considerably prolonged. Thus, when kept in the refrigerator at room temperature or in the incubator their virulence remained unchanged for 20, 5 and 2 days, and the infectivity was lost after 30, 15 and 6 days, respectively.

In order to verify the possibility of oral transmission of toxoplasmosis, experiments were also carried out on the effect of gastric juice on the parasite. For this purpose hamsters were given food mixed with various concentrations of infected exudate. Of those which were fed with undiluted material or in dilutions from 1 in 10 to 1 in 1,000 all became infected and died, while among those which were fed with exudate diluted to 1 in 10,000 half of the animals failed to become infected, and none were infected with dilutions upwards of 1 in 100,000. Since in the foregoing experiments the infection might have resulted from invasion of mucous membranes by the toxoplasms, the experiments were modified by introducing the parasites directly into the stomach by means of a catheter. In this case, exudate diluted up to 1 in 100,000 caused infections which were fatal to hamsters in 5-30 days, whereas no deaths resulted from dilutions of 1 in 1,000,000. Finally the parasites were exposed to human gastric juices *in vitro*. The results varied with the amount of free HCl present: at an acidity of 11-20 [presumably cc. of N/10 HCl per 100 cc.] the parasites were killed in 60 minutes, at 21-40 in 30 minutes, at 41-50 in 20 minutes and at 51-70 in 10 minutes.

It is concluded that while peroral transmission may be successful in hamsters, it is unlikely to cause infection in human beings, unless the acidity of their gastric juices is considerably lowered. C. A. Hoare

SCORZA, J. V., DAGERT B., Cecilia & AROCHA, L. I. Estudio sobre hemoparasitos de *Bufo marinus* L. da Venezuela. 1. Hemogregarinas—2. Uma nova espécie de *Toxoplasma*. [**Blood Parasites of *Bufo marinus* in Venezuela. I. Haemogregarines. II. A New Species of *Toxoplasma***] Mem. Inst. Oswaldo Cruz. 1956, Oct., v. 54, No. 2, 373–91, 4 text figs. & 17 figs. on 3 pls. [17 refs.] English summary.

DERMATOLOGY AND FUNGUS DISEASES

O'HERN, E. M. & HENRY, B. S. **A Cytological Study of *Coccidioides immitis* by Electron Microscopy.** *J. Bacteriology*. 1956, Nov., v. 72, No. 5, 632–45, 32 figs. [29 refs.]

This is a cytological study of *Coccidioides immitis* in saprophytic and in parasitic life, conducted with the use of the electron microscope. Cells of the mycelial form of the fungus from culture, and of the parasitic spherule or sporangial form from the brain tissue of experimentally infected mice, were washed free from extraneous matter and examined in very thinly-cut sections, by means of the electron microscope, at magnifications of 10,000 to 35,000 diameters. The relevant technical procedures are described.

The cell of *C. immitis* in the mycelial phase possesses a spherical or lobulated nucleus measuring from 0.7 to 1.7 μ in diameter, enclosed by a double nuclear membrane about 25 $m\mu$ in thickness, which is perforated by pores about 50 $m\mu$ in diameter. Nucleoli are generally demonstrable as discrete bodies of greater density than the nuclear matrix and not having a limiting membrane. Mitochondria of elongate shape, sometimes showing a double membrane, lie adjacent to the nucleus and apparently in contact with it.

The development of a mycelial septum begins with the division of the cytoplasm by the formation of a cytoplasmic membrane. This membrane then splits and cell wall material is laid down between its two layers, beginning at the marginal zone. At this time, granules of undetermined nature and function, measuring 0.1–0.4 μ appear in the cytoplasm on both sides of the septum. Older, thick septa show a central, dense layer, probably an abscission layer, but no associated granules. The cytoplasmic membrane on the cell wall and septum may be smooth or convoluted. In the latter case the convolutions appear contiguous to cytoplasmic organelles, nuclei and mitochondria.

In the parasitic spherule or sporangial phase the nucleus measures from 1.5 to 2.0 μ in diameter, but in other respects it resembles that of the mycelial phase, except for the presence of some dense intranuclear granules measuring 15–60 $m\mu$.

Mature endospores, at the time of their release from the sporangium, are often multinucleate and show variation in the number of their nuclei. This may be due, in some measure, to delay in their release after maturity and to their development towards the sporangial stage, or to partial repression of development of the sporangium, in which fewer cleavage segments are formed and the resulting endospores are larger and multinucleate, and the sporangial wall may be unduly thick. In contrast, sporangia developing in the yolk sac of the chick embryo are relatively large and thin-walled and the numerous endospores are small and uninucleate.

The cell wall of the spherule or sporangium contains chitin in a protein matrix, but, apparently, no cellulose. The outer layer of the wall is a capsular structure which is "osmiophilic" and appears to contain mucopolysaccharide. It is carried out into club-like or spinous projections from the surface of the sporangium. For other reports on the cell wall of this fungus, see BLANK and BURKE, and TARBET and BRESLAU [this *Bulletin*, 1954, v. 51, 983; 1953, v. 50, 970].

J. T. Duncan

CREITZ, J. R. **Atypical Tissue Forms of *Coccidioides immitis* resembling *Blastomyces*.** *Amer. J. Clin. Path.* 1956, Nov., v. 26, No. 11, 1254-60, 7 figs.

What appear to be budding forms of the spherules of *Coccidioides immitis* in the lesions of coccidioidomycosis in man and in experimentally infected animals, have been noticed from time to time by various observers, since the pioneer studies on the fungus by RIXFORD, GILCHRIST and OPHÜLS. To some, however, the appearance of the two cells lying in apposition or united has suggested an act of conjugation rather than budding.

The present author, from his own observations of fresh, wet preparations of exudate or tissue from active lesions, using a 2 mm. objective, has described 2 modes of formation of the paired cells. The first is a process of budding, similar to that seen in the yeasts, in which the bud is formed by outward pressure of the cytoplasm on a point on the cell membrane which has become thinned or softened; the young bud may be attached by a broad base, as in *Blastomyces*, or its point of attachment may be constricted so that it resembles a pedicle. A septum separates the mother and daughter cells, which may be equal in size. In the other process, the cell elongates and develops an equatorial constriction and a septum dividing it into two more or less equal parts. The septum presents a double wall, each half being continuous with the outer wall of the adjacent daughter cell; soon the separation is complete but the individual cells may remain in apposition. Sometimes they remain connected and present a figure-of-8 form. One or both of the paired cells may develop into a mature sporangium.

The budding cells seem to be chiefly free endospores or young spherules

about 4 μ in diameter, and they may be found in areas where many sporangia are maturing and discharging their endospores. The most suitable material for this study is the experimentally infected mouse, about 4 to 10 days after inoculation, before the immunity response of the host has had the effect of retarding the development and maturation of the sporangia.

The importance of these budding cells to the pathologist is that, despite their small size, they might be mistaken for the budding spherules of *Blastomyces dermatitidis*.

J. T. Duncan

STRAUB, M. & SCHWARZ, J. **Coccidioidomycotic Thoracic Lesions in Dogs in Tucson, Arizona.** *Arch. Pathology*. 1956, Dec., v. 62, No. 6, 479-88, 17 figs. [11 refs.]

In an investigation into the occurrence of coccidioidomycosis in dogs in Tucson, Arizona, an area of the endemic infection, histological examinations were made on the lungs and tracheo-bronchial lymph nodes of 33 apparently healthy, stray dogs, and 1 suffering from canine distemper, killed at the Pima Animal Shelter. 8 of the dogs were found to have been infected with *Coccidioides immitis*; a proportion which compares closely with the same authors' observation of 8 instances of arrested coccidioidal lesions in 40 hospital patients who had died of other diseases.

The lesions in the 8 dogs are described in detail, and discussed *vis-à-vis* the corresponding stage of the disease in man, so far as this is known or surmised. [See FORBUS and BESTEBREURTJE, this *Bulletin*, 1948, v. 45, 269.]

In 4 of the animals the lesions were comparable to those seen in man, the evident primary foci consisting of small, apparently arrested, subpleural nodules, with central caseation in which the alveolar structure of the lung could still be discerned; in 2 calcification was beginning. The capsule was more granulomatous than in man, but the findings supported the authors' observation on the human disease, that "the capsule of the primary coccidioidal focus was the result of interstitial granulomatous extension of the disease process". Unusual findings were the presence of 2 separate and simultaneous primary foci in 2 of the dogs, and a probably unique primary focus in the bronchial wall, without involvement of the surrounding lung parenchyma. In this instance, the focus had discharged into the bronchial lumen, constituting an instance of "bronchogenic dissemination in the making".

In dogs, as in man, subclinical infection by *C. immitis* results in a much less pronounced primary complex than in histoplasmosis or in tuberculosis. In the non-arrested disease, however, extension to the lymph nodes, in coccidioidomycosis, must be regarded as a stage in dissemination.

Lesions of the acute bronchopneumonic type may be associated with the presence of the endospores, which in some of the present cases were

detectable only by the use of Grocott's silver stain, whereas intra-alveolar and interstitial granulomatous inflammation was generally caused by the spherule form. The difference between the exudative and productive types of lesion may, in part, be attributable to the state of allergy of the host.

This paper is an instructive study in the comparative pathology of primary pulmonary coccidioidomycosis. J. T. Duncan

MAFFEI, W. E. & HUNGRIA, J. S., Jr. Tumor blastomycótico do femur. [**Blastomycotic Tumor of Femur**] *Arquivos dos Hosps. Santa Casa de S. Paulo*. 1956, Mar., v. 2, No. 1, 41-54, 4 figs. [20 refs.] English summary.

In South American blastomycosis (Lutz's disease) a solitary lesion of the skeletal system not associated with disseminated disease is extremely rare. The patient in the present case, a 15-year-old male Brazilian agricultural labourer, suffered from a painful disorder of the hip joint which caused him to limp. The pain, which was more or less continuous, was exacerbated by walking and tended to radiate downward to the knee. There were no signs or symptoms referable to disease in any other part of the body. The tissues of the thigh showed some degree of atrophy, and, on palpation, a deep, rather fluctuant swelling, painful on pressure, was determined in the region of the hip joint. Passive and active movements of the joint were both restricted in range, but there was no articular grating on movement.

An X-ray examination showed an irregularly outlined focus of osteolysis, with well defined margins, in the neck of the femur. There was no reactive periostitis and the articulation of the hip joint was not involved. Pus obtained by puncture of the swelling appeared to be bacteriologically sterile, and the presumptive diagnosis of osteolytic tumour was made. The following diseases were excluded after a discussion of their distinctive characteristics: metastatic carcinoma, syphilitic gumma, osteo-articular tuberculosis, Boeck's sarcoid, osseous cyst, giant cell sarcoma, multiple myeloma, Ewing's tumour, and chronic localized osteomyelitis.

Surgical treatment was applied, and a histological examination of some of the tissue removed showed a chronic, granulomatous inflammatory reaction with scattered, multinucleate giant cells containing fungal spherules, consistent with the granuloma of Lutz's disease. On this observation, sulphadiazine was administered in the dosage of 0.5 gm. every 3 hours, but at the end of a month the treatment was stopped because of a significant fall in the granulocyte count.

The search for the primary focus of the disease revealed chronic, non-active lesions of Lutz's disease in a cervical lymph node and in the tonsil of the same side.

The combination of surgical and sulphonamide treatments caused a

marked clinical and radiological improvement but the case was not followed up to ultimate cure, as the patient was lost to sight.

J. T. Duncan

TROPICAL OPHTHALMOLOGY

CHARAMIS, J. & TACTICOS, G. Données récentes sur l'évolution du trachome en Grèce. [**Current Knowledge of the Evolution of Trachoma in Greece**] *Rev. Internat. du Trachome*. 1956, v. 33, No. 4, 517-23.

KORNBLUETH, W., FEIGENBAUM, A. & BERNKOPF, H. The Presence of Complement Fixing Antibodies to the Group Specific Antigen of Psittacosis-Lympho Granuloma Venereum Group in the Sera of Trachoma Patients. Reprinted from *Acta XVII Conc. Ophth.* 1954, 1506-11.

These tests were made with Lygranum complement-fixation antigen and 2 MHD complement, fixation being allowed to take place overnight at 4°C. The sera were tested initially at a dilution of 1 in 8 and the result was considered positive if less than 50% haemolysis occurred; sera positive at 1 in 8 were then titrated.

Of the sera from 104 patients suffering from various stages of trachoma 25 (24%) were positive at 1 in 8 or higher. The incidence of positive reactions was higher in those with active trachoma—20 in 48—than in those in whom the disease was inactive—5 in 56. In a control group of 63 persons representing a random cross-section of the population of Jerusalem, 4 (6·3%) gave a positive reaction.

[This evidence purporting to show that patients with trachoma develop psittacosis-lymphogranuloma group antibodies is unconvincing. Most workers would hesitate to accept partial fixation at 1 in 8 as positive and yet 10 out of the 25 positive sera had titres no higher than this.]

S. P. Bedson

BORDENAVE, J. F. & BOUVET, G. Note sur la lutte anti-trachomateuse dans les écoles de la presqu'île du Cap-Vert (Dakar—A.O.F.). [**Note on the Antitrachomatous Campaign in the Schools of the Cap Vert Peninsula (Dakar, A.O.F.)**] *Rev. Internat. du Trachome*. 1956, v. 33, No. 4, 524-32.

HEAT STROKE AND ALLIED CONDITIONS

LEMAIRE, R., PILLE, G. & DUCROS, H. Influence de la race sur l'adaptation au climat saharien. [**Influence of Race on Adaptation to the Climate of the Sahara**] *Bull. Inst. Français d'Afrique Noire*. Ser. A. 1955, Oct., v. 17, No. 4, 1221-30, 3 graphs & 1 fig.

In order to test whether indigenous people of the tropics would adapt to a desert climate better than Europeans, 6 Senegalese and 6 Europeans were flown from Dakar to Atar in the Western Sahara. They remained for 3 days resting in the shade at a mean daily temperature of 31.3°C. (88.5°F.), relative humidity 9-36%, on an Air Force desert survival diet of 800 calories per day. Each person received 3 litres of water per day but was urged to drink as little as possible.

Albumin and casts were not found in the urine and chloride was only slightly diminished because of supplements in the ration and salt tablets. Europeans lost more body weight, had greater haemoconcentration (estimated according to the refractive index of serum), and passed less urine than Senegalese, findings consistent with the observed greater fluid intake in the Senegalese. The density of the urine increased in both groups but urinary urea concentration remained the same. Sweating (estimated by the galvanic skin resistance of Richter) was greater in Europeans.

From these results an attempt was made to draw up a fluid balance and it was suggested that Senegalese may have had greater insensible water loss, indicating greater acclimatization to heat. *M. L. Thomson*

MISCELLANEOUS DISEASES

BEET, E. A. **Heart Disease in Severe Anaemia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Sept., v. 50, No. 5, 472-7, 4 figs. on 2 pls.

In Northern Nigeria heart failure among Africans was found in this study to be secondary to severe anaemia in 9.5% of 358 cases. It was of the high output type, the apex beat was displaced to the left and an increase in pressure in the jugular vein was present—although the point is made that that is to be expected in anaemia as a compensatory mechanism aiding cardiac filling, and is not of itself a sign of heart failure. Other signs of heart failure included enlargement of the liver, oedema of the legs and sacrum, and crepitations at the lung bases. In some cases there were anasarca, pericardial and pleural effusions. The pulse pressure was raised and carotid pulsation in the neck was marked. In the jugular veins a venous hum and a thrill were detectable. Murmurs were also frequently audible over the praecordium. A systolic murmur is always

present in these cases and in part is due to mitral incompetence. A mid-diastolic murmur audible at the apex of the heart may be confused with that of mitral stenosis. It is caused by the large flow of blood passing through the mitral valve as the left ventricle fills, the mitral valve being narrow relative to the dilated cavity of the left ventricle. This murmur is well heard if the pulse is slow. A diastolic murmur caused by dilatation of the aortic ring and consequent aortic incompetence may also be audible.

The diagnosis of anaemia caused by heart failure is facilitated if the nails, conjunctiva and buccal mucous membrane are invariably examined. Rheumatic heart disease may be simulated but in it there is a lowered cardiac output, low systolic blood pressure, low pulse pressure and no venous thrill or hum in the neck. Presystolic accentuation of the murmur is suggestive of mitral stenosis and an opening snap is never present in anaemic heart disease. Bacterial endocarditis may be simulated by the anaemia and by the pyrexia from which patients with severe anaemia may suffer. Aortic regurgitation, chronic anoxic lung disease, thyrotoxicosis, arteriovenous aneurysm, uraemia and liver disease may give rise to similar cardiovascular manifestations but in them there is not an increase in venous return sufficient to give rise to the neck signs seen in severe anaemia.

Treatment in these cases depends on the cause of the anaemia but in this series most patients responded to iron.

There are some interesting illustrations showing the shrinkage of the heart following treatment.

A. W. Woodruff

GANATRA, R. D. & LEWIS, R. A. **Hetrazan in Tropical Eosinophilia.**

Indian J. Med. Sci. 1955, Nov., v. 9, No. 11, 672-81, 2 figs.

[17 refs.]

In a series of 26 cases of tropical eosinophilia 13 patients were treated with diethylcarbamazine (Hetrazan) and 13 with carbarsone. All showed the "classical triad of symptoms; cough, attacks of difficulty in breathing and constitutional debility". In no case was the eosinophil count less than 5,000 cells per cmm. Skiagrams were not taken, but fluoroscopy was performed before and during treatment. The findings were not consistently characteristic. Physical examination of the chest was of little value in diagnosis.

Both drugs were given by mouth. Carbarsone was given in doses of 0.26 gm. twice daily for 10 days. Diethylcarbamazine was given for 4 days, in daily doses of 13 mgm. per kgm. body weight. The patients were followed up in the out-patient department for a variable time; improvement and return to normal was judged on a clinical basis combined with eosinophil counts.

In the carbarsone series, all had symptomatic relief, in 10 patients it was complete within 20 days of the commencement of treatment and the

remaining 3 within 40 days. In all cases the eosinophil counts returned to normal during the period of observation, and in 9 cases there was a reduction of 50% during the course of the 10 days treatment.

In the diethylcarbamazine series, 11 patients showed symptomatic relief within 20 days of commencement of treatment and almost all felt better immediately after the completion of the 4-day course, but 3 noticed a slight aggravation of symptoms after 1 or 2 doses. One patient had a slight symptomatic relapse and one did not respond to treatment, but developed a pleural effusion. In 11 cases the eosinophil count returned to normal within the period of observation. In one case after an initial fall to below 50% there was a slight subsequent rise and another showed only a slow gradual fall. From the graph it appears that there was a much more prompt initial fall in the diethylcarbamazine than in the carbarsone cases.

L. E. Napier

TANEJA, P. N. & SETH, R. K. **Congenital Porphyria. Case Reports and Review.** *Indian J. Child Health.* 1956, Dec., v. 5, No. 12, 707-17, 4 figs. & 1 chart. [11 refs.]

GELFAND, M. & MITCHELL, J. D. **Bantu Porphyria. A Clinical Study of Sixteen Cases.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Jan., v. 51, No. 1, 62-8, 2 figs. [11 refs.]

The authors give the main findings in 16 Bantu patients with porphyria admitted to the Salisbury Hospital, Southern Rhodesia. All exhibited a darkened skin and blisters and in most cases a discoloured urine. The onset was gradual with blisters on the fingers and hands. The hyperpigmentation was most marked and constant in the face. 2 patients had had mild abdominal discomfort, none had exhibited any psychological or neurological disorder although such a case had been seen previously by GELFAND [this *Bulletin*, 1956, v. 53, 932]. Porphyrins were present in the urine of all patients. The colour of the urine varied at times from amber to burgundy but darkened on exposure to the sun. Urobilin was constantly present. The liver was enlarged in 11 and frequently hard and irregular. In the 12 in whom liver function tests were performed abnormal thymol turbidity and flocculation tests were found in 11.

The urines of 56 other patients, including 26 suffering from cirrhosis of the liver and 5 from pellagra, were tested for porphyrins, with negative results. Negative urines were also obtained from 15 Africans, the skin of whose faces was darker than the skin elsewhere.

The part played by alcohol in the syndrome is difficult to determine although local African opinion attributes the disorder to the excessive consumption of a potent alcoholic liquor called *skokiaan*.

Probably the red urine of some patients leads to an erroneous diagnosis of schistosomiasis.

Frederick J. Wright

MCPHEE, W. R. **Acquired Hemolytic Anemia caused by Ingestion of Fava Beans. Report of a Case and Review of Cases reported in American Literature.** *Amer. J. Clin. Path.* 1956, Nov., v. 26, No. 11, 1287-1302. [30 refs.]

"1. The paper deals with the description of a 4-year-old white boy (of Italian extraction) who had malaise, fever, hematuria, anemia, and jaundice a short while after the ingestion of fava beans. The child recovered after transfusions of whole blood.

"2. Fifteen cases of favism are summarized from papers published in the United States, with emphasis on (1) pertinent data from the medical histories, (2) significant findings in the physical examinations, and (3) the results of laboratory studies. There were no fatalities in this series.

"3. The pathogenesis of favism is discussed, particularly in regard to the mechanism that leads to hemolytic anemia. Hypogammaglobulinemia may prove to be the most significant factor in the development of acute hemolytic anemia that results from sensitivity to fava beans or the pollen of the flowering plant (*Vicia faba*)."

SELYE, H. & BOIS, P. **Effect of STH on Experimental Lathyrism.** *Proc. Soc. Exper. Biol. & Med.* 1957, Jan., v. 94, No. 1, 133-7, 8 figs.

"Experiments in rats indicate that somatotrophic hormone (STH) can greatly aggravate skeletal manifestations of experimental lathyrism that are produced with aminoacetonitrile (AAN). This is so even under conditions whereby STH fails to stimulate growth in length."

CLEMMONS, J. J. & ANGEVINE, D. M. **The Occurrence of Multiple Fractures in Suckling Rats injected with B-Aminopropionitrile (*Lathyrus* Factor).** *Amer. J. Path.* 1957, Jan.-Feb., v. 33, No. 1, 175-87, 4 text figs. & 6 figs. on 2 pls. [15 refs.]

PARASITOLOGY : GENERAL

GAUD, J. A propos de la récente présentation d'un organisme observé dans un frottis de sang humain. [**An Organism observed in Human Blood Film**] *Bull. Soc. Path. Exot.* 1956, May-June, v. 49, No. 3, 462-4, 1 fig. on pl.

The author records the finding in a blood-film, taken in 1941 from a Moroccan patient who was suffering from a febrile condition, of a group of 8 banana-shaped organisms, each measuring $8 \times 2.5 \mu$. These bodies corresponded exactly to those described by LE GAC and LAMY from an

Indo-Chinese patient [this *Bulletin*, 1956, v. 53, 1278] but differed in dimensions. However, in the discussion of the present paper, Dr. Lamy admitted that a mistake had been made in his calculations and that the organisms in the Indo-Chinese case actually measured $10\ \mu$ in length. Since only one group of the bodies in question was found in the film of the Moroccan case and none was ever seen in thousands of others examined subsequently, the author concludes that they represented pseudo-parasites. The bodies in question are depicted in a photomicrograph.

C. A. Hoare

LIPS, M. & RODHAIN, J. Quelques hématozoaires de petits mammifères du Haut-Katanga. [**Some Blood Protozoa of Small Mammals in the Upper Katanga Region, Belgian Congo**] *Ann. Parasit. Humaine et Comparée*. 1956, Oct.-Dec., v. 31, Nos. 5/6, 481-8, 4 figs.

PROC. ROY. SOC. MED. 1956, Nov., v. 49, No. 11, 871-82 (Sect. Comp. Med. 19-30), 6 figs. [40 refs.] **Discussion on Synergy in Chemotherapy** [GOODWIN, L. G.; BUTTLE, G. A. H.; KENDALL, S. B.; BOYLAND, E.; KNOX, R.; COLLIER, H. O. J.; ALBERT, A.; GARROD, L. P.; BEVERLEY, J. K. A.].

GOODWIN discussed the sulphonamides and folic acid antagonists in malaria and toxoplasmosis. Hitherto the selection of chemotherapeutic agents has been empirical; trial and error will still play an important part in the search for others. As the related metabolism of host and parasite is better understood the chemical structure of substances likely to interfere with it can more readily be predicted; the development of pyrimethamine is an example of this. The cell's synthesis of nucleoprotein is essential to its welfare; sulphonamides interfere with this synthesis by competing with the *p*-aminobenzoate (PAB) essential to bacterial growth. The PAB leads to the synthesis of folic and folinic acids necessary to the formation of purines and pyrimidines from carbon and nitrogen. The diaminopyrimidines and proguanil antagonize the growth-promoting folic acid in bacterial cultures, and they do the same in malaria infections. Pyrimethamine, the least toxic compound of the former group, operates during nuclear division of the malaria parasite—its most vulnerable point—when the schizont is dividing. Its toxicity to the host is low as human cells use preformed folic and folinic acid absorbed from the gut, whereas the malaria parasite synthesizes them from PAB. Sulphonamides compete with PAB and also shew anti-malarial activity.

The synthesis of folinic acid from PAB can therefore be interrupted at 2 points; when both sulphonamide and pyrimethamine are given to infected chicks their effect is much greater than when either is given alone. The drugs potentiate each other by blocking different parts of

the metabolic process; one-eighth dose of pyrimethamine plus one-seventh dose of sulphadiazine produce the effect of a full dose of either drug given alone. If pyrimethamine and proguanil are given together there is no potentiation; both act only on the folic-folinic-acid system and their effect is merely additive, not synergistic.

The potentiating effect of sulphonamide and pyrimethamine is also seen in experimental infections with *Toxoplasma* in mice; the proportions used are one-eighth dose of the former together with one-twenty-fifth dose of the latter. A practical application of this finding to 29 human cases of toxoplasmosis has produced clinical betterment in 17 of them. Very big doses (75 to 100 mgm. daily for 10 days) of pyrimethamine were given with 0.5–1.5 gm. of sulphadiazine. The former caused toxicity, but supplements of folic or folinic acid may well lessen this. Other purine and pyrimidine antagonists are available; these with sulphonamides and pyrimethamine show progressive potentiation against certain bacteria.

BUTTLE defined "synergy" as the production of a greater effect by two or more agents acting together than the sum of their action; this is the same as "potentiation", the word used in pharmacology. Any lesser effect is an "additive" effect. The sequential blocking of the folic-folinic-acid pathway by pyrimethamine and sulphonamide in the case of the malaria parasite and coccidia is an example of synergy. Most work on synergy in relation to the bacteria has been empirical; biochemistry has contributed little to it. Synergic treatment of various bacterial infections is widely used, and it is now being examined as a weapon against malignant disease.

KENDALL, after an account of the life cycle of *Eimeria tenella* of the domestic fowl, detailed the stages at which various drugs, notably sulphadimidine and pyrimethamine, are effective against it. The two given concurrently completely control the disease; when either is given alone the mortality is at least 50%; in controls it is over 90%. Synergistic treatment over a 24-hour period during the second, third or fourth days of infection has this marked action; given before that it has only a temporary effect.

BOYLAND discussed synergism in cancer therapy. Surgery, radiotherapy and chemotherapy are increasingly being used in combination. The chemotherapeutic agents used are hormones, antimetabolites, antibiotics and nitrogen mustard derivatives. "Negative hormonal therapy" includes orchidectomy, oöphorectomy, adrenalectomy and hypophysectomy; these are done in sequence rather than simultaneously. A system of synergistic treatment is much needed for malignant disease.

KNOX, speaking of drug combinations in the treatment of bacterial infections, said that the words "synergism" and "antagonism" need definition. Theoretically there can be no such thing as synergism; if 2 drugs act on the same receptor of a cell their combined effort can only be additive, not synergistic. If they act on different receptors quantitative

comparisons cannot be made. Apparent synergism can be produced in many ways; it may be caused chemically or physically, or by a combination of such agencies. Amygdalin and emulsin when given separately are non-toxic to rabbits; given together they kill, by the liberation of free hydrocyanic acid. Iron and oxine given separately have little effect on *Staphylococcus aureus*; given together they kill it. Clinically the effect of penicillin is enhanced by giving Benemid, which blocks its excretion through the kidneys. *Bacillus cereus* grows well at 37°C. in penicillin a hundred times more concentrated than it will at 42°C.—possibly because the enzyme penicillinase is formed at 37°C. but not at 42°C. None of these is synergism; “synergism” may vanish as soon as it is explained.

ALBERT considered “sequential blocking” to be one of the most effective mechanisms of synergy. Entire blocking of the first enzyme may not be achieved; to increase the block from 90% to 100% would usually call for an inordinate increase in the amount of the drug, and this would be prejudicial to the patient's life. A second 90% block at a later stage of enzyme development would leave only 1% of the factor—a very small amount. Another effective mechanism of synergy is the use of a substance, preferably inert, to prevent wastage of the drug by influencing storage, elimination, destruction or diffusion of the drug in a way favourable to the desired end.

GARROD also thought that “potentiation” is a better term than “synergy” in describing some of the effects of chemotherapy. Some combinations of drugs will achieve effects not produced by either alone in any dose; for example, the sterilizing effect of penicillin together with streptomycin on *Streptococcus faecalis*. BEVERLEY said that sulphadimidine, 4·4-diamino-diphenylsulphone, and pyrimethamine are all anti-toxoplasma drugs. There is synergy between sulphadimidine and pyrimethamine, and between the sulphone and pyrimethamine; but there is only an additive effect between sulphadimidine and the sulphone.

A. R. D. Adams

KALBE, Irmgard. Parasitologische Abwasseruntersuchungen in einigen Städten der Deutschen Demokratischen Republik. [**Parasitological Investigations of Waste Waters in Some Cities of the German Democratic Republic**] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete*. Berlin. 1956, Sept.-Oct., v. 2, No. 5, 334-43.

This is an account of the findings of parasitological investigations of the sewage of the towns or cities of Görlitz, Frankfurt (Oder), Cottbus, Spremberg, Weisswasser, Hoyerswerda, Bautzen, Rudolstadt, Saalfeld, Arnstadt and Gotha. The examination for the enumeration of helminth ova by means of the McMaster method is described. Tables set out the numbers of ova of *Ascaris lumbricoides*, *Taenia* sp., *Enterobius* sp., *Trichuris* sp., *Strongyloides* sp., and *Oesophagostomum* sp. which were found.

In some of the cities the sewage was used for the irrigation of fields where crops were to grow without any prior treatment and in others the treatment given to the sewage before irrigation was inadequate. Only in Arnstadt and Frankfurt were the conditions found to be relatively satisfactory.

The undoubted dangers to health of the bad methods of sewage treatment in most of these cities are discussed and some of the literature on the existing heavy incidence of helminth infections in the German Republic is quoted.

M. E. Delafield

STOJAŁOWSKA, Wanda & MONIUSZKO, Alina. Pasożyty przewodu pokarmowego dzieci w żłobkach i przedszkolach Lublina. [**Parasites of the Alimentary Tract of Children in Nurseries and Preparatory Schools in Lublin**] *Ann. Univ. Mariae Curie-Skłodowska*. Lublin. Sect. D. 1955, v. 10, 405-22. [12 refs.] English summary.

In 1953-54, the authors examined 2,455 children under 7 years of age in nurseries and schools in Lublin and in adjacent rural areas for the presence of intestinal parasites. The percentages of helminths found varied from 20.6 to 71.4 with highest incidences in rural areas.

The commonest parasite was *Enterobius*, 7.2% to 28.9% when a single examination was made: 3 examinations increased the incidence by 7.3%. *Trichuris* amounted to 5.7% in younger children and 26.1% in older children in nursery schools: in rural areas it was 31.8%. *Ascaris* accounted for 2.4% in nurseries, 9.9% in preparatory schools and 20.4% in rural areas.

Diphyllobothrium (5) and *Hymenolepis* (1) were found only in one rural area. In 877 children, mixed helminthic infections were found.

Special attention was paid to the presence of *Giardia*, which was found in 8.6% to 40.4%, principally in children of 3 to 5 years. Other protozoa were found in smaller numbers.

H. J. O'D. Burke-Gaffney

GAUD, J. & CHEDECAL, M. Les parasites intestinaux au Maroc. [**Intestinal Parasites in Morocco**] *Maroc. Méd.* 1956, Nov., v. 35, No. 378, 1058-64. [18 refs.]

This study was undertaken in order to assess the importance of the various intestinal parasites in Morocco by comparing the incidence of symptomless carriers with those showing clinical effects. Tables show the prevalence of amoebic dysentery in various areas. Since 1928 the incidence has declined while that of bacillary dysentery has increased, probably as a result of better diagnosis. One report records a great increase in amoebic dysentery carriers among phosphate miners between 1938 and 1945, but in children the carrier rate has dropped. Clinical amoebic dysentery appears to be rare where carriers are numerous.

Giardia intestinalis is even more common in healthy carriers, particularly

in children, than in persons with intestinal symptoms. The incidence of other intestinal flagellates varied independently of each other in different years. *Trichomonas intestinalis* appears in epidemic waves particularly in persons with intestinal complaints, while *Chilomastix mesnili* shows a more stable incidence and is more common in healthy persons. *Balan-tidium coli* is not uncommon and is often non-pathogenic; among 280 schoolchildren 4.6% were infected but without symptoms.

Ascaris lumbricoides is more common in urban than in rural areas as is also *Trichuris trichiura*. These two parasites appear more frequently together than separately. Their prevalence is related to population density and soil humidity. *Ancylostoma duodenale* is affected by these factors and also by high temperatures; it is present in the phosphate miners and is surprisingly absent elsewhere in Morocco. Eggs of *Enterobius vermicularis* and *Taenia* sp. were found in the stools but no attempt was made to determine the infection rate. *Strongyloides stercoralis* was encountered only twice during the survey. *Hymenolepis nana* was fairly common, with incidence rates up to 12%, but did not appear to cause symptoms.

T. H. Davey

LAWLESS, D. K., KUNTZ, R. E. & STROME, C. P. A. **Intestinal Parasites in an Egyptian Village of the Nile Valley with emphasis on the Protozoa.** *Amer. J. Trop. Med. & Hyg.* 1956, Nov., v. 5, No. 6, 1010-14.

"The incidence of intestinal parasites, with emphasis on the protozoa, in a small sample of the agricultural population of the Nile valley in Egypt was determined by study of stool specimens. A single specimen was taken on 6 separate surveys over a period of 2½ years. Figures for incidence of the protozoa and most of the helminths are unusually high. *Entamoeba histolytica*, *E. coli* and *Endolimax nana* occurred in 97, 98 and 93 per cent of specimens respectively. *Enteromonas hominis*, a protozoan frequently overlooked, was detected in 74 per cent. Fourteen per cent of the people had the small race of *E. histolytica* alone, whereas only 3 per cent were infected with the large race alone. Hookworm and *Trichostrongylus* eggs were found in 71 and 70 per cent respectively of specimens examined, *Ascaris* in 51 per cent and *Enterobius vermicularis* in 59 per cent. Such a high incidence of infection reflects the living conditions of the people from whom the material for examination was obtained."

RUSSELL, H. T. & NELSON, B. M. ***Pneumocystis* Pneumonitis in American Infants. Report of Two Cases, with Autopsy Studies.** *Amer. J. Clin. Path.* 1956, Nov., v. 26, No. 11, 1334-40, 3 figs. [10 refs.]

"1. The paper deals with the description of fatal pneumonitis caused by *Pneumocystis carinii* in 5½- and 14-month-old girls from widely

separated towns in Oklahoma. The chief pathologic finding in the 2 patients was a pneumonitis that was characterized by foamlike eosinophilic material in the alveoli, and a slight to moderate degree of cellular infiltration (mononuclear in type). *Pn. carinii* was demonstrated in the alveoli by means of special stains.

"2. Pneumocystis infection is discussed in regard to the broader experience with this disease in Europe and the question of relation to cytomegalic inclusion disease and interstitial plasma cell pneumonia."

JAHN, E. & ROLLER-GUSINDE, R. E. Zur Serologie und Klinik der interstitiellen plasmacellulären Pneumonie. [**Serology and Clinical Features of Interstitial Plasma Cell Pneumonia**] *Klin. Woch.* 1957, Jan. 1, v. 35, No. 1, 37-41.

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

SMART, J., **A Handbook for the Identification of Insects of Medical Importance.**

This book was reviewed on p. 512.

GAUD, J., LAURENT, J. & FAURE, P. Arthropodes vecteurs possibles de maladies au Maroc. [**Arthropods of Medical Importance in Morocco**] *Maroc Méd.* 1956, Dec., v. 35, No. 379, 1259-66. [Numerous refs.]

The insects of possible medical importance in Morocco are briefly reviewed. 19 species of ticks are recorded with their normal hosts. *Ornithodoros erraticus* and *Rhipicephalus sanguineus* bite man frequently and are associated with the transmission of relapsing fever and *fièvre boutonneuse*, respectively. *Hyalomma savignyi* has been found in Morocco infected with *Rickettsia burneti* [see this *Bulletin*, 1947, v. 44, 709, 898]. The mite fauna is not well known.

The most frequent species of *Anopheles* are *A. m. labbranchiae* and *A. hispaniola*. The former species is common, especially along the coast between Tangier and Mazagan, and has been recorded at heights up to 1,900 metres. Development takes place throughout the year with the maximum flight of the adults in the spring. *Anopheles hispaniola* is found throughout Morocco, especially on higher ground, and is recorded at heights up to 2,500 metres. 7 other species of *Anopheles* have been found in Morocco, including *A. sergenti* and *A. multicolor*, but are less

frequent or rare. Of other mosquitoes 10 species of *Culex*, 3 of *Theobaldia*, 10 of *Aedes* and one each of *Uranotaenia* and *Orthopodomyia* are listed with their frequency and domesticity. Some species of *Aedes* and *Culex* are biting nuisances. *A. aegypti* is rare.

Although human leishmaniasis is uncommon some of the 9 species of *Phlebotomus* are numerous. The commonest is *P. minutus parroti* which rarely bites man and appears to feed mostly on reptiles. However, *P. longicuspis*, *P. sergenti* and *P. papatasi* are domestic and anthropophilic. The Simuliid and Ceratopogonid faunas are not well known. About 20 species of *Simulium* are known [specific names are not given; see this *Bulletin*, 1954, v. 51, 323]. *Culicoides saevus* and *Holoconops mediterraneus* both bite man, and *Leptoconops bezzii* is known to bite man in Tunisia.

A table is given of other biting flies, belonging to the Tabanidae, Muscidae and Pupipara, together with their normal hosts. The inclusion of the robber fly *Asilus barbarus* in this table is surprising. *Wohlfahrtia magnifica*, *Chrysomyia albiceps*, *Musca domestica vicina*, *M. domestica cuthbertsoni* and *M. sorbens* are included in a table of domestic calyptrate flies.

Pulex irritans is common in Morocco, although decreasing with the use of insecticides, and *Xenopsylla cheopis* is also recorded with 10 other species of flea. *Pediculus humanus*, *Phthirus pubis*, *Cimex lectularius* and *C. rotundatus* are recorded from the region. An outbreak of louse-borne relapsing fever was last recorded in 1946.

The inhabitants of Morocco have a fear of a biting animal called *bou nif* (the animal with the long nose) and among a variety of insects submitted under this name were some reduviid bugs. There is also a record of the Homopteran *Athysanus vulnerans* biting man. B. R. Laurence

- I. GÂNDARA, Á. F. Contribuição para a elaboração da carta de Glossinas de Angola. [**Data on Glossina in Angola**] *Anais Inst. Med. Trop. Lisbon*. 1956, Sept., v. 13, No. 3, 371-85, 1 graph & 4 maps. English summary (7 lines).
- II. ————. Subsídio para o estudo dos "Culicidae" (Diptera) de Angola. [**Additional Data on Mosquitoes in Angola**] *Ibid.*, 387-418, 1 map. [18 refs.] English summary.
- III. ————. Subsídio para o estudo dos "Culicidae" (Diptera) de S. Tomé e Príncipe. [**Additional Data on Mosquitoes of S. Tomé and Príncipe**] *Ibid.*, 419-28. [14 refs.] English summary (4 lines).

These 3 papers are mainly locality records.

I. Among a collection of 14,930 tsetse flies there were *Glossina palpalis palpalis* (8,621), *G. fuscipes quanzensis* (4,662), *G. schwetzi* (879) and *G. morsitans* (768), their distribution is shown on separate maps.

II. A collection of nearly 5,000 mosquitoes, larvae and adults made in the years 1952-55 in parts of Angola was examined and more than 20

species of anophelines and 40 of culicines were identified; 26 species previously recorded but not found by the present author are also listed. A map shows the situations and altitudes of the localities mentioned.

III. A collection of mosquitoes made in the islands of S. Tomé and Príncipe is recorded in the same way and shows that 15 species were recorded; 6 species previously recorded but not found by the present author are also listed. There is no map with this paper. *H. S. Leeson*

THOMAS, T. C. E. **A Note on the Occurrence of *Culex* (*Culex*) *pipiens fatigans* in Sierra Leone.** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 421-5, 2 figs.

Comparison of the few previous records of *Culex fatigans* [*C. p. fatigans*] for Sierra Leone, and particularly Freetown, with observations in 1955 show that this mosquito has increased appreciably in numbers in Freetown during the past 15 years or so. The present author has not found it outside the Freetown area, and concludes that it has been introduced by shipping. The mosquito is urban and markedly endophilic and usually, but not always, anthropophilic. Water in pit latrines and polluted streams are typical breeding places. Some data are given on morphological features of the male genitalia, the wing venation, and chaetotaxy of the females. *D. S. Bertram*

GILLETT, J. D. **Genetic Differences affecting Egg-Laying in the Mosquito *Aedes* (*Stegomyia*) *aegypti* (Linnaeus).** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 362-74. [33 refs.]

Fed females of the Newala (Tanganyika) strain of *Aedes aegypti* require also to be mated before ovulation takes place, but ovulation is largely independent of mating in a Lagos strain of the same species, ovulation being defined as the passage of ripe oöcytes into the oviduct. Oviposition occurs within 5 days in the Lagos strain but rarely, under these conditions, for the Newala strain. Ovulation appears to be controlled by a hormone, the presence and expression of which have a genetical basis of a multifactorial nature. The paper sets out in the text and tables a full account of the crosses and back-crosses between the two strains. This phenomenon, and probably other variations in behaviour or in susceptibility to infections of what appear to be a single species of mosquito, indicate the fundamental reality of intraspecific differences in mosquitoes.

D. S. Bertram

GILLETT, J. D. **Initiation and Promotion of Ovarian Development in the Mosquito *Aedes* (*Stegomyia*) *aegypti* (Linnaeus).** *Ann. Trop. Med. & Parasit.* 1956, Dec., v. 50, No. 4, 375-80. [22 refs.]

It is shown, for 3 strains of *Aedes aegypti*, that decapitation of fed females before digestion has proceeded more than 8-14 hours (at 28°C.)

prevents eggs from going beyond stage 3. There is no interference with development to stage 5 when decapitation is done after this interval. There appear to be two phases in egg development from the resting stage (stage 2); these are referred to as initiation and promotion. The first may be due to a nervous stimulus, possibly resulting from the distension of the stomach on feeding, and enables development to advance to stage 3. This is followed by promotion to full development to stage 5 which is dependent upon sufficient hormone secretion, apparently from the brain, circulating in the body. The hormone seems to promote better retention and utilization of the blood meal. D. S. Bertram

DAVIES, D. M. & PETERSON, B. V. **Observations on the Mating, Feeding, Ovarian Development, and Oviposition of Adult Black Flies (Simuliidae, Diptera).** *Canadian J. Zool.* 1956, Dec., v. 34, No. 6, 615-55, 7 figs. (5 on pl.). [125 refs.]

ABONNENC, E. Sur la morphologie de *Phlebotomus freetownensis* var. *magnus* Sinton, 1932 et de *Phlebotomus freetownensis* var. *sudanicus* Theodor, 1933 d'après des individus provenant d'élevage. [**Morphology of Laboratory Strains of *Phlebotomus freetownensis* var. *magnus* and *P. freetownensis* var. *sudanicus***] *Arch. Inst. Pasteur d'Algérie.* 1956, Sept., v. 34, No. 3, 388-99, 7 figs. [10 refs.]

LEVINSON, Z. H. & BERGMANN, E. D. **Steroid Utilization and Fatty Acid Synthesis by the Larva of the Housefly *Musca vicina* Macq.** *Biochem. J.* 1957, Feb., v. 65, No. 2, 254-60, 1 fig. [Numerous refs.]

"1. Housefly larvae are able to synthesize body fat from dietary protein; they require neither fatty acids nor carbohydrate in the medium. Furthermore, they reproduce normally without any dietary source of fat during larval and adult life.

"2. Cholesterol in quantities of 2 μ g./g. of diet stimulates growth of housefly larvae. Larval growth is proportional to the concentration of dietary cholesterol, up to a certain limit. Excess of cholesterol in the diet has no adverse effect.

"3. The influence of steroid structure on the utilizability has been studied. It has been found that some steroids are not only not utilized, but they inhibit the utilization of other steroids.

"4. Cholesterol utilization by housefly larvae is reversibly inhibited by cholesteryl chloride.

"5. The utilization of steroids by insects is discussed in connexion with their feeding habits."

MACKERRAS, I. M. **The Tabanidae (Diptera) of Australia. I. General Review.** *Australian J. Zool.* 1956, Dec., v. 4, No. 3, 376-407, 8 text figs. & 12 figs. on pl. [Numerous refs.] **II. Subfamily Pangoniinae, Tribe Pangoniini.** *Ibid.*, 408-43, 9 text figs. & 12 figs. on pl.

CHRONICLE WORLD HEALTH ORGANIZATION. 1956, Dec., v. 10, No. 12. 397-402, 1 fig. & 1 chart. **Resistance of Insects to Insecticides.**

This article presents in a readily assimilable way the principal facts on resistance of insects to insecticides at the present time, discussing briefly the function of the World Health Organization in stimulating and coordinating research on the many aspects of this increasingly serious problem.

D. S. Bertram

SMITH, C. N. **Conversion Tables for Larvicide Applications.** *Mosquito News.* 1956, Dec., v. 16, No. 4, 269.

The need to convert dosages of larvicide from pounds per acre to parts per million of water, and *vice versa*, constantly arises in mosquito control work.

The author now presents reference tables which have been found useful in various laboratories in the U.S. He first sets out the commonly required unit equivalents:

1 acre = 43,560 square feet
1 cubic foot = 7.48 gallons
1 acre-foot = 43,560 cubic feet = 325,829 gallons
1 gallon of water = 8.337 pounds
1 pound = 453.59 grammes

and then gives a table showing the pounds per acre equivalent to parts per million (wt./wt.) in water at different depths, as follows:

Parts per Million	Pounds per acre in Water at Indicated Depth		
	1 Inch	4 Inches	1 Foot
1.0	0.226	0.904	2.716
.9	.203	.814	2.444
.8	.181	.723	2.173
.7	.158	.633	1.901
.6	.136	.542	1.630
.5	.113	.452	1.358
.4	.090	.362	1.086
.3	.068	.271	.815
.2	.045	.181	.543
.1	.023	.090	.272

Finally a table is presented to show equivalent dosages of insecticides applied to flooded areas on the basis of pounds per acre. This table gives

equivalents for 0.005 to 3.0 pounds per acre. The following example is taken from that table.

Pounds per Acre	Grammes per Acre	Grammes per 100 sq. feet	Parts per Million (wt./wt.) in Water		Million Parts of Water per Part of Insecticide at 12 inch Depth
			12 inches Deep	1 inch Deep	
1.00	453.6	1.04	.368	4.42	2.72
1.25	567.0	1.30	.460	5.52	2.17
1.5	680.4	1.56	.552	6.62	1.81
2.0	907.2	2.08	.736	8.83	1.36
2.5	1,134.0	2.60	.920	11.04	1.09
3.0	1,360.8	3.12	1.104	13.25	.906

[It is suggested that in addition to their own usefulness in everyday work these tables may stimulate the preparation of others for similar purposes, *viz.*, dosage of insecticides on surfaces of walls.]

H. J. O'D. Burke-Gaffney

ALESSANDRINI, M. E. & CHIARI, I. **Tests on the Suspensibility of Insecticidal Water-Dispersible Powders.** *Selected Scientific Papers from Istituto Superiore di Sanità.* Rome. 1956, v. 1, Pt. 1, 50-67, 4 figs. Original Italian appears in *Rendiconti Istituto Superiore di Sanità.* 1956, v. 19, Pt. 11, 978-1000.

Using different methods proposed by other workers, the authors have carried out a series of tests on the suspensibility of some insecticidal water-dispersible powders, in order to establish the best method to be adopted by the Committee of Experts on Insecticides of the WHO. The insecticides used were two formulations each of DDT and methoxychlor.

The original methods involved the introduction of a pipette into the cylinder containing the suspension, to remove aliquot samples for the determination of the amount of active substances they contain. In view of the fact that the introduction of a pipette agitates the particles in suspension, the authors recommend, on the basis of their results, that for reproducibility of results an automatic sampling device be incorporated with the cylinder. This takes the form of an outlet tap. The volume of suspension should be 250 ml. and the sample taken preferably 50 ml. It is considered convenient to determine the quantity of insecticide present as residue in the cylinder after the sample has been removed, rather than to determine the amount of insecticide in the sample. The residue is dissolved in acetone and rapidly evaporated. It is considered essential to maintain a uniform temperature, as variations in temperature may cause a change of viscosity, differences in particle size, and uneven settling of the floccules due to convection currents.

The suspensibility may be expressed by reference to the substance soluble in acetone and insoluble in water, rather than to the active substance.

W. Z. Coker

ALESSANDRINI, M. E., MOSNA, E. & PLACUCCI, G. **Studies on the Behaviour of some Chlorinated Hydrocarbons, sprayed on Bricks of Different Materials used for the Construction of Buildings in Various Countries. Note I. Loss of Effectiveness by DDT.** *Selected Scientific Papers from Istituto Superiore di Sanità.* Rome. 1956, v. 1, Pt. 1, 68–102, 13 figs., 15 charts (7 coloured & 1 folding) & 7 coloured pls. Original Italian appears in *Rendiconti Istituto Superiore di Sanità.* 1956, v. 19, Pt. 11, 1001–1035.

This paper deals with the persistence of DDT in several types of bricks used for the construction of buildings in certain countries in the Middle East. The bricks are chiefly made of mud, but one type of brick consists of cement and sand.

The bricks, made to the same dimensions, were each mechanically sprayed with a 5% suspension of a dispersible powder containing 75% DDT at the rate of 2 gm./m². Chemical and biological tests were made at varying intervals to determine the persistence of the DDT. The chemical tests involved the determination of the amounts of DDT and DDE present on the surface of the brick and at a depth of 0.5 mm., by means of spectrophotometric methods. The results indicate (1) that dehydrochlorination does not occur to any appreciable extent with time; (2) after spraying, the distribution of DDT on the brick is not uniform; (3) the actual amount of DDT that remains on the brick after spraying is relatively small, and (4) the residual effect of the DDT is dependent on the nature of the brick. The mud-bricks contained very small amounts of DDT by the 10th week, whereas the cement-sand brick showed appreciable quantities of DDT even after 31 weeks.

For the bioassay, young blood-fed female *Aedes aegypti* were exposed to the treated bricks for 60 minutes, and subsequently released in clean recovery cages. Knockdown values after the exposure were recorded; and mortality counts were made 24 hours later. It was again shown that with the mud-bricks mortality had dropped below 10% after 6–9 weeks from the spraying. The residual effect of DDT in the cement-sand brick remained strong longer than 6 months.

The results from the chemical and biological studies indicate that the persistence of the residual action of DDT depends on the structure and composition of the treated material, and that the loss of residual action is not due to dehydrochlorination of the DDT.

W. Z. Coker

ALESSANDRINI, M. E. & PLACUCCI, G. **Studies on the Behaviour of some Chlorinated Hydrocarbons, sprayed on Bricks of Different Materials used for the Construction of Buildings in Various Countries. Note II. Absorption of DDT.** *Selected Scientific Papers from Istituto Superiore di Sanità.* Rome. 1956, v. 1, Pt. 1, 103–27, 8 figs. Original Italian appears in *Rendiconti Istituto Superiore di Sanità.* 1956, v. 19, Pt. 11, 1036–1060.

In this note it is shown that the loss of effectiveness of DDT sprayed on the mud-bricks is due to an absorption phenomenon.

With the same bricks as were used for the chemical and biological assays [above], a series of layers 0.5 mm. thick were removed from the surface to a depth of 2.0 mm. The quantities of DDT and DDE present in each layer were determined, and the sum of all these found to correspond roughly to the amount of DDT sprayed. It is significant that 24 hours after spraying almost all the DDT was present in the topmost layer (0.0-0.5 mm.). This would indicate that the loss of effectiveness of DDT in the mud bricks with time is due to absorption into the deeper layers.

Chemical analysis of the components of the bricks failed to show that the loss of effectiveness of the DDT is correlated with the presence of iron oxides or of other chemical components supposed to favour absorption or catalyse dehydrochlorination.

Physical tests revealed that the absorption occurs by capillary diffusion through the pores of the brick in inverse ratio to the size of the pores.

W. Z. Coker

BARLOW, F. & HADAWAY, A. B. **Effect of Changes in Humidity on the Toxicity and Distribution of Insecticides sorbed by some Dry Soils.** [Correspondence.] *Nature*. 1956, Dec. 8, v. 178, 1299-300.

It has been noticed in mosquito control that there is an apparent correlation between relative humidity and the effectiveness of insecticidal deposits in houses made of mud walls and thatched roofs [this *Bulletin*, 1956, v. 53, 976]. This phenomenon could be due to relative humidity making the mosquito more vulnerable after it has picked up the deposits, or possibly modifying the availability of the insecticide to the mosquito. These two aspects have been investigated in the laboratory.

There was no effect of wide changes in relative humidity upon the kills of mosquitoes after they had been topically contaminated with DDT, gamma BHC, dieldrin or Diazinon, or after exposure to deposits of wettable powders of DDT, gamma BHC or dieldrin.

Dried mud blocks are known rapidly to adsorb insecticides applied as surface deposits of wettable powders [*ibid.*, 1956, v. 53, 682]. It was found in this work that the rate of adsorption of DDT, dieldrin and gamma BHC was reduced with increase in relative humidity. With dieldrin, however, even at a dosage of 100 mgm./sq. ft. and 90% relative humidity, the insecticide disappeared from the surface of Uganda mud blocks in about 5 days. Biological tests were made on blocks sprayed 21 days previously with a suspension of dieldrin crystals at 100 mgm./sq. ft. Some of the blocks were kept for 24 hours at 40% and others at 90% relative humidities. After the test the blocks were interchanged in the two humidities and again tested. The results showed that insecticidal activity increased with humidity from 40% to 90% and that the difference in activity was almost completely reversible in 24 hours. DDT and BHC

behaved similarly. Chemical determination of distribution of insecticide in the blocks kept at the two humidities did show, however, that the rate of diffusion of the insecticides into the blocks, after sorption was complete, actually increased with rise in humidity; this resulted in eventual loss of the poison from the surface of the mud. At any level of concentration, however, the insecticidal activity of the surface of the mud block increased with a rise in humidity.

It is suggested that the soil adsorbs water preferentially to insecticide, and at high humidities, because the soil particles are saturated with water, the insecticide is less closely bound to the soil particles than in drier soil. In these conditions, it would seem, the insecticide more readily disperses throughout the soil. On the one hand it penetrates deeply and, on the other hand, is more readily removed from the soil surface on to resting insects.

W. Z. Coker

REPORTS AND SURVEYS

CONRAN, O. F. & CONRAN, A. **Medical Survey of Tonkolili and Adjacent Valleys, Sierra Leone.** *J. Trop. Med. & Hyg.* 1956, Dec., v. 59, No. 12, 285-94, 1 map.

The preliminaries of a new mining development have begun in the valley of the Tonkolili river about 30 miles within the foothills which border the broad coastal plain of Sierra Leone. The Company wisely decided to have a medical and entomological survey of the area with its indigenous population of about 2,300 people. This paper is a report of the medical survey, in the process of which practically everyone living within the leased area was examined: the examination included the microscopical examination of blood and stools.

There were no signs of malnutrition in the locality, and most people looked positively well fed. However in 2 of the poorer villages cassava was replacing rice because of inadequate supply of this cereal, and children were seen with the classical signs of protein deficiency.

74% of people were positive for malaria, the dominant parasite being *Plasmodium malariae* except in the new labourers, who had just arrived and who were infected with *P. falciparum*. The impression gained in the examination of slides from children was that infections were light and showed a single phase of parasite indicating a single inoculation. Spleens do not enlarge very early in life as they would in a hyperendemic area. *Anopheles gambiae* were shown to be transmitting the disease.

53% were infected with onchocerciasis, the vector being *Simulium damnosum* which breeds in the main river. This disease constitutes the most serious medical problem in the area. No cases of trypanosomiasis

were seen, although a few *Glossina palpalis* were found near the river. Yaws is endemic in the area and the incidence of 12% is modified by past treatment. All patients seen were treated with penicillin.

The incidence of leprosy was 3.4% and 7 of 70 cases were lepromatous. In the absence of X-ray facilities it was impossible to be certain of the diagnosis in 15 cases of suspected tuberculosis.

Of the helminthic infections hookworm and *Ascaris* were present in just over 50% and schistosomiasis was diagnosed in 5 persons, all of whom were newcomers to the area. Trachoma was commonest in children and women, with an overall incidence of 9%.

Information on child mortality was difficult to obtain as many women could not recall how many children they had borne and were often incapable of remembering at what age they had died. The conclusion was that of 1,725 children born to women in the area 732 had died. The average age achieved by adults lay between 40 and 45 years. Death was usually due to cardiovascular catastrophes, strokes being very common.

In their conclusion the authors deprecate any procrastinating policy, in that to provide a hospital and allow the doctor and staff to await the appearance of the sick will achieve nothing and will dissipate finance allocated for medical purposes. An active field service could wipe out yaws, leprosy and trachoma and prevent their reappearance. Hookworm and *Ascaris* could be greatly reduced by mass therapy and by the provision of pit latrines for each household with instructions in their use and maintenance. Field work would also involve the control of mosquito breeding places associated with the mining operations; the use of residual insecticides to prevent epidemic malaria due to the introduction of *P. falciparum*; and the application of insecticide to control the breeding of *Simulium* in the rivers.

The medical service should concentrate on what might be called "out patient" work and the training of auxiliary medical and field staff. Relatively few "in patient" beds would be necessary to start with.

R. Ford Tredre

BOOK REVIEWS

ROSE, Walter. **Snakes—mainly South African.** pp. xvi + 213, numerous illustrations. 1955. Cape Town: Maskew Miller Ltd. London: Bailey Bros. & Swinfen Ltd. [24s.]

This fascinating little book might well be called *Snakes without Tears*. It is written in a lucid, friendly style which successfully transmits to the

reader a tremendous amount of general and technical information, of interest to tyro and expert alike. The author's object was to produce a book to enlighten and educate the public in their approach to snakes, especially with regard to such beliefs as "all snakes are poisonous" and "green snakes are not poisonous". [The reviewer once saw a medical officer on the Gold Coast, who believed the latter fancy but was otherwise intelligent, holding up a green mamba by the tail to the delight of his colleagues.] In this he has succeeded admirably. Among other things he deprecates the indiscriminate slaughter of non-poisonous varieties. He believes in leaving them alone if possible. A quotation will illustrate his point.

"... it is preferable to the method adopted by two Namaqualand men, who, finding a cobra in an outhouse, sprayed it with paraffin and set it alight. Their clothing caught fire and they had difficulty in escaping from the building, which was burnt down. One man jumped into a dam and both were taken to hospital. However, it was believed that the cobra perished in the flames, so the main object was achieved. . . ."

"A motorist, seeing a snake on the road near Villiersdorp, endeavoured to kill it by running over it. A coloured man thinking it was dead, picked it up, was bitten and died in Caledon Hospital. . . . It really is wiser to leave them alone."

The first Chapters deal with generalities, such as feeding habits, reproduction and anatomical variations. There are separate chapters on *Colubrinae*, *Dasypeltinae*, *Boiginae*, *Elapidae*, *Viperidae* and *Hydrophiidae*. The final chapters "Myth or Fact?", "Selected Snake Stories" and "Brief Encounters" are delicious. As an example may be quoted the advice which does away for ever with the myth of the milk-sucking snake (an impossible feat anatomically in any case). "Our advice to the farmer whose Native boy reports that a snake has been stealing a cow's milk is to sack his informant. . . ."

B. G. Maegraith

GURR, George T. [F.R.I.C., M.B.A.C.]. **Biological Staining Methods.** 6th Edition. pp. vi + 102, 4 pls. (3 coloured). 1957. London: George T. Gurr Ltd., 136 & 138, New King's Road, S.W.6. [5s.]

Since the 5th edition [this *Bulletin*, 1953, v. 50, 169] of this book was published some 5 years ago, the text has been revised, several additional methods have been included and the number of formulae considerably extended.

The section on histological embedding methods is fuller and the whole book is 15 pages longer than its predecessor. It continues to be a well-presented handbook, clearly set out for easy reference and brought up to date in its present form.

H. J. O'D. Burke-Gaffney

VAUCEL, M. **Médecine tropicale. Mise à jour de la collection médico-chirurgicale 1956.** Loose-leaf pp., 1 fig. Paris (VI^e): Éditions Médicales Flammarion, 22, rue de Vaugirard.

Médecine tropicale has already been reviewed in this *Bulletin* [1953, v. 50, 587; 1956, v. 53, 264]. The two volumes are in loose-leaf form to enable revisions to be made from time to time. Those for 1956 relate to ascariasis, malaria, rabies in the tropics and affections due to abnormal haemoglobins.

John Rathborn

NOTICE

The Bureau has for sale one set of the four volumes (Nos. 1-40) of the *Sleeping Sickness Bulletin* and one set of the three volumes (1911-1915) of the *Yellow Fever Bulletin*. These are now extremely rare. Both journals are in excellent condition and both are bound, the former in half leather and the latter in cloth. Enquiries should be addressed to the Secretary, Bureau of Hygiene and Tropical Diseases, Keppel Street, Gower Street, London, W.C.1.